FIRST AERO WEEKLY IN THE WORLD

FLIGHT

The AIRCRAFT ENGINEER

A JOURNAL DE[VOTED TO] PRACTICE, AN[D] LOCOMOTI[ON]

OFFICIAL ORGAN [OF THE ROYAL AERO CLUB OF THE UNITED] KINGDOM.

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FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

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Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

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Oct. 31 .... **Guggenheim Safe-Aircraft Competition Closes.**

Nov. 7 .... **Lecture, "Recent Developments of Fuels and Dopes for Aircraft Engines," by Dr. A. E. Dunstan, before R.Ae.S. and Inst. Ae.E.**

Nov. 21 .... **Lecture, "The Inspection of Materials," by Mr. L. W. Johnson, before R.Ae.S. and Inst.Ae.E.**

Nov. 28 .... **Lecture, "Flying and Maintenance from the Owner's Point of View," by Sq.-Ldr. H. M. Probyn, before R.Ae.S. and Inst. Ae.E.**

Dec. 5 .... **Lecture, "Recent Work on the Autogiro," by Senr. J. de la Cierva, before R.Ae.S. and Inst.Ae.E.**

Dec. 12 .... **Lecture, "The Development of Materials for Aircraft Purposes," by Dr. W. Rosenhain before R.Ae.S. and Inst.Ae.E.**

1930—

Jan. 22 .... **Lecture, "The Strategical Mobility of Air Forces," by Gp.-Capt. C. L. Courtney, before Royal United Service Inst.**

Mar. 5 .... **Lecture, "Air Co-Operation with Mechanised Forces," by Wing-Com. T. L. Leigh-Mallory, before Royal United Service Inst.**

EDITORIAL COMMENT

THERE is significance, and probably a good deal more than mere coincidence, in the fact that just as the first British airship, R.101, has been launched, the large Dornier flying-boat, or flying ship, as they call it, having run out of superlatives, the Do.X has made a flight with no less than 169 persons on board. This is, of course, far and away the greatest number of people ever taken into the air in a single aircraft, and thus sets up another milestone in the history of aviation progress.

Airship or Flying-Boat

It is almost inevitable that comparisons should be made between the Do.X and the R.101, and it is very natural that the man in the street should be asking himself the question, which of the two types will prove the better? Unfortunately, that question cannot at present be answered with any degree of certainty. Even if full data were available, which is not the case, no simple and definite answer could be given with any assurance. The airship and the flying-boat differ so much, fundamentally, that a direct comparison is scarcely possible. One can do what the other cannot, and *vice versa*.

The reports that have appeared concerning the flight of the Do.X have been so contradictory that it is impossible to get at the exact figures. The best that can be done is little better than a guess. One thing appears certain: On its flight of about 50 minutes, the Dornier Do.X carried 169 persons on board.

Without knowing the amount of fuel carried during the flight it is, of course, impossible to assess accurately the disposable load lifted, and in the absence of accurate figures for tare weight it is equally impossible to estimate the gross weight lifted. Some approximate idea of the load-carrying ability of the Do.X may, however, be formed from the known facts. If the 169 persons carried on board during the flight were all Germans, it would appear fair to assume that their average weight was not less than 150 lbs. apiece. That figure would give 25,350 lbs. as the weight of the "live" load. As the 12

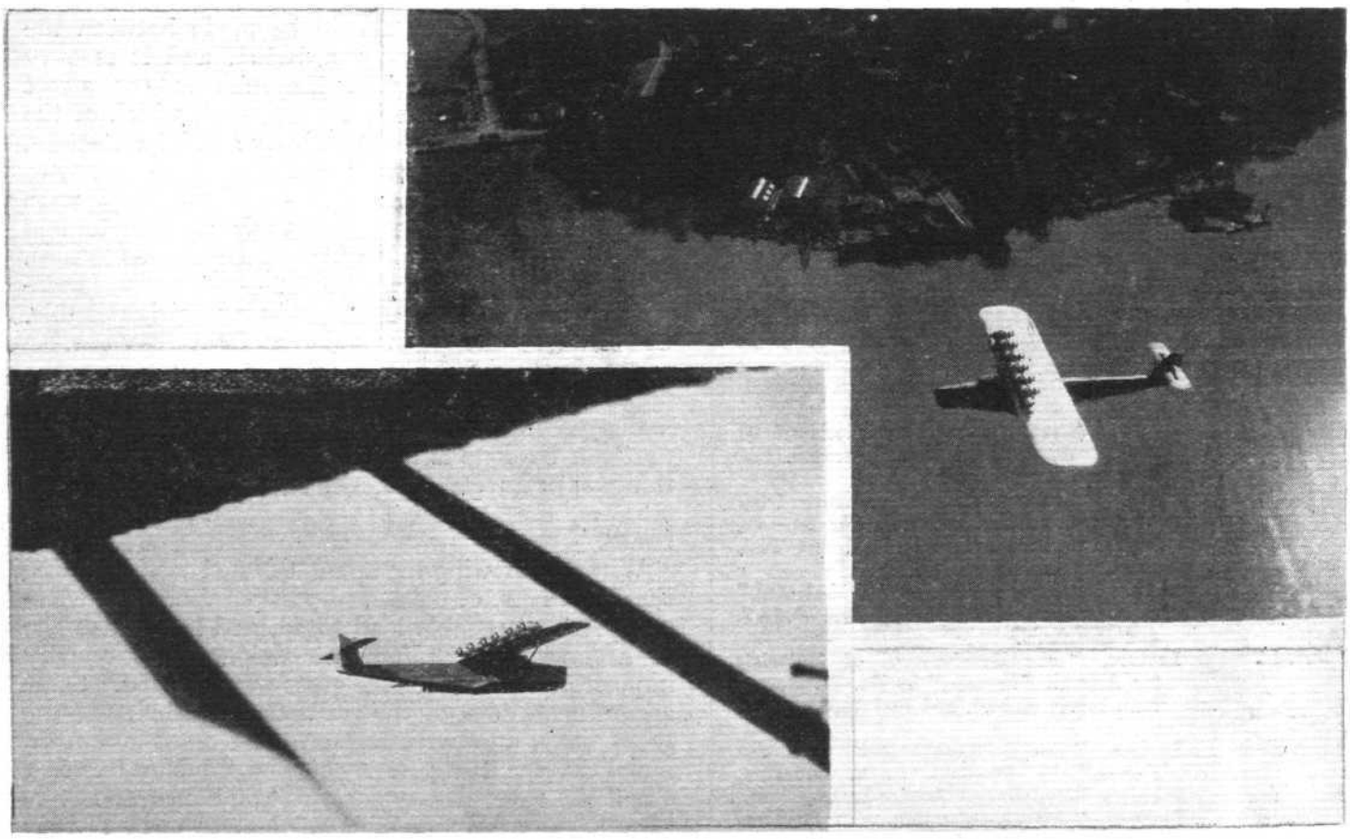
Siemens-Jupiter engines develop a total of some 6,000 b.h.p., the live load carried would represent about 4·25 lbs./h.p. Now, if all the persons had been passengers, this would not be a bad pay load, although to assess its real merit one would have to know the range which the machine had with such load. It may, however, safely be assumed that out of the 169 persons, 10 were crew. We are informed that the normal crew of the machine, when operating on a regular route, will be 9 or 10: a commander, two pilots, a wireless operator, a chief engineer and four mechanics, and possibly a steward.

Reports vary considerably as to the amount of fuel carried on the flight, some stating that it carried enough for 750 miles, which seems unlikely. A more probable assumption is that, as the machine remained aloft for nearly an hour, it would carry but a fairly small reserve. If it is assumed that the machine did carry fuel for two hours, which may be close to the actual figure, the fuel weight would probably be in the neighbourhood of 6,000 lbs., and the total load lifted would in that case be 31,350 lbs., or about 5·25 lbs./h.p. On this assumption, and subtracting the weight of a crew of ten and fuel for 2 hours, the pay load would be reduced to 4 lbs./h.p. Although this is not a very high figure for a two-hours' range, it is by no means bad.

One must, however, assume that this flight with 169 persons on board was in the nature of an overload test, or at least that if the actual weight lifted did not exceed that which the machine would normally carry, at any rate the passenger accommodation would not normally suffice for such a large number. Consequently, one is forced to the conclusion that on longer routes, and with more cubic space per passenger, the pay load would be reduced to a considerably lower figure. This in itself indicates that as a commercial proposition the Do.X might not be quite so favourably placed as might be thought at first sight. Technically, however, the machine is an exceedingly interesting experiment.

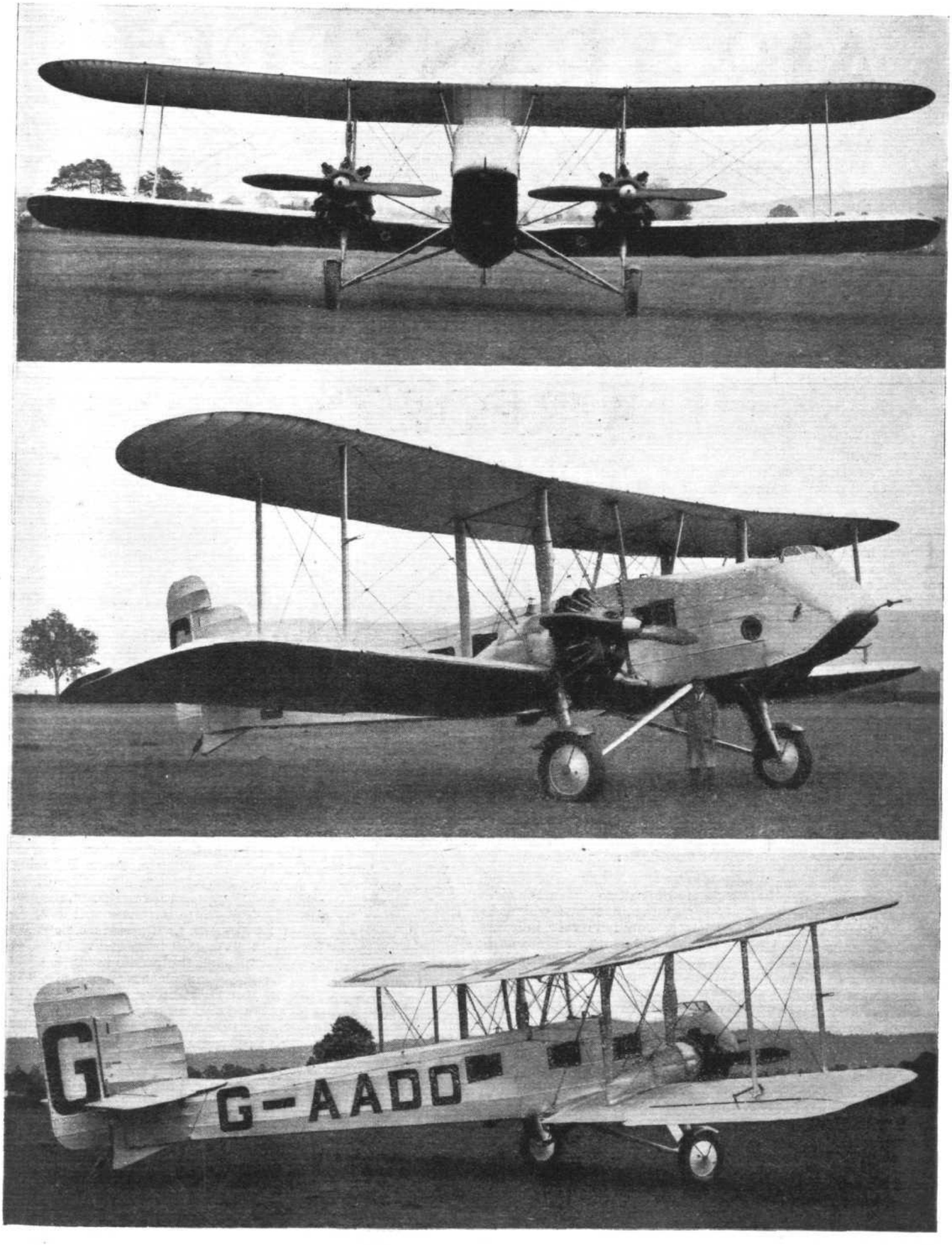
One should, in attempting to assess the utility of such a large machine, bear in mind that gross weight will also greatly influence the problem, as it determines the power loading and wing loading, and consequently the power reserve in hand, or in other words the margin of safety from forced landings in case of failure of one or more engines. The figure 50 tons has been mentioned as the gross weight of the Do.X. Whether this figure be correct or not we do not know. If it is, and bearing in mind that probably metric tons are meant, the gross weight would be 110,000 lbs., or a power loading of about 18·3 lbs./h.p. The wing area of the Do.X is believed to be about 5,300 sq. ft., which would give a wing loading of nearly 21 lbs./sq. ft. The two figures, taken in conjunction, indicate a machine with a very small speed range, which is merely another way of saying a machine with a very small power reserve, certainly very much smaller than that demanded of British commercial aircraft. And if the gross weight figure of 50 tons is correct, the approximate estimate which we have made of fuel and "live" loads indicates a ratio of disposable load to gross weight of approximately 14·25: 50, or 28·5 per cent. This is with a load that is believed to have represented an overload, and in actual use, on a route, the figure might readily drop to 25 per cent. Compared with a machine like the Vickers "Vellore," which carries more than its own weight in load, this is not very encouraging.

R.101 uses but one-half the power to transport its pay load, but against that must be set the need for a crew about three times as large as the crew of the Do.X, representing not only weight to be carried but also cost of crew's wages.



The Dornier Do.X Fitted with 12 Siemens-built "Jupiters," this machine recently made a flight with 169 persons on board.

FOR UNSUBSIDISED FLYING



THE GLOSTER AIR SURVEY MACHINE: Two of these machines, fitted with Bristol "Jupiter" engines, have been built, of which the one shown is to be put into service by the Aircraft Operating Co. The other is for sale, and would, as an alternative, be very useful as a commercial aeroplane.
("FLIGHT" *Photos*)

AIR TRANSPORT

AIR Transport, of mails, passengers and goods, is now undoubtedly firmly established —not so much at present in this country, perhaps, as abroad—and is growing in importance day by day. The time has come, we consider, when this side of aviation should have a section in FLIGHT under the above distinctive heading.

This week we start this section appropriately with the interesting article below by Mr. Francis Wood on "Airports"—for without airports, air transport would "be at sea." Especially, also, having regard to the airport plans in embryo and contemplated, and the practical work already in progress in this direction at various important centres in Britain, and the municipal interest aroused in these plans, as evidenced by the Conference on Municipal Airports called for November 5 in London.

AIRPORTS

By FRANCIS WOOD, M.Inst.C.E.

(Borough Engineer and Surveyor to the County Borough of Blackpool)

THE outstanding progress in the construction of engines of high power in a small compass and of light weight has enabled the development of aeroplanes to become one of the most extraordinary of modern times. The simplicity of control and safety devices have encouraged not only the sportsman, but the female sex, who are taking to the aeroplane as one of their particular perquisites in a manner that must have its effect upon the hitherto average and conservative male sex.

It must be amazing to the general public that there are only rare cases of airmen losing their way in the air. The flight of Colonel Lindbergh and others across the Atlantic, the race round Europe in the air by pilots, who have never before taken the same trip, with little or no error, are perhaps extraordinary examples of what can be done. Most of them are young and their experience in navigation very limited, compared with what is regarded as necessary for officers on board ships at sea. It must, therefore, be quite evidently the case that there are not many difficulties to overcome in order to control and direct an aeroplane, and therefore its more popular use will be only a matter of time.

Land Marks

There are no sign posts or visibly defined routes in the air. There are certainly distinctive features in towns which a pilot will probably recognise, but it would be very helpful to all pilots, however skilful, if there were some definite and well-known and easily recognisable objects or marks which will denote in plain and convincing manner the town or district from the air.

Such a City as London, with its River Thames and its bridges, the Houses of Parliament, Hyde Park, the Tower, etc., are so well known that there would not be any necessity to indicate that city. Similarly, this would be the case with Liverpool with its River Mersey, the docks, the Cathedral, etc. There would be no mistaking Blackpool as the tower is well known all over the world. York Cathedral is distinctive, and so on with other towns.

The map-drawing specialists will doubtless in the very near future prepare a map specially for air transport with each town plainly indicated by small photographic replicas of some four outstanding features which can be plainly visible, by which as soon as they are seen, the town will be recognised. This, or some similar idea, is likely to develop, because those interested in the progress of air transport from either a national, pleasure or business point of view, will attain their object more quickly by interesting the public in light machines; the individual who becomes the owner of a machine, may be able to afford to keep a pilot, as a motor-car owner keeps a chauffeur; alternatively he will become his own pilot, and although one pilot may have natural navigable instincts, there will be many others who will not have the same aptitude to read plans or recognise towns in their present undefined state. Outstanding and well defined land marks will, therefore be for the benefit of all concerned.

These distinctive characteristics will be largely assisted in most cases by the provision of aerodromes or airports which may have the outline of its boundaries of a peculiar shape, or be situated near a lake or sheet of water, or through its area have the name of the town marked with large letters across the length of the landing ground.

Provision for Airport

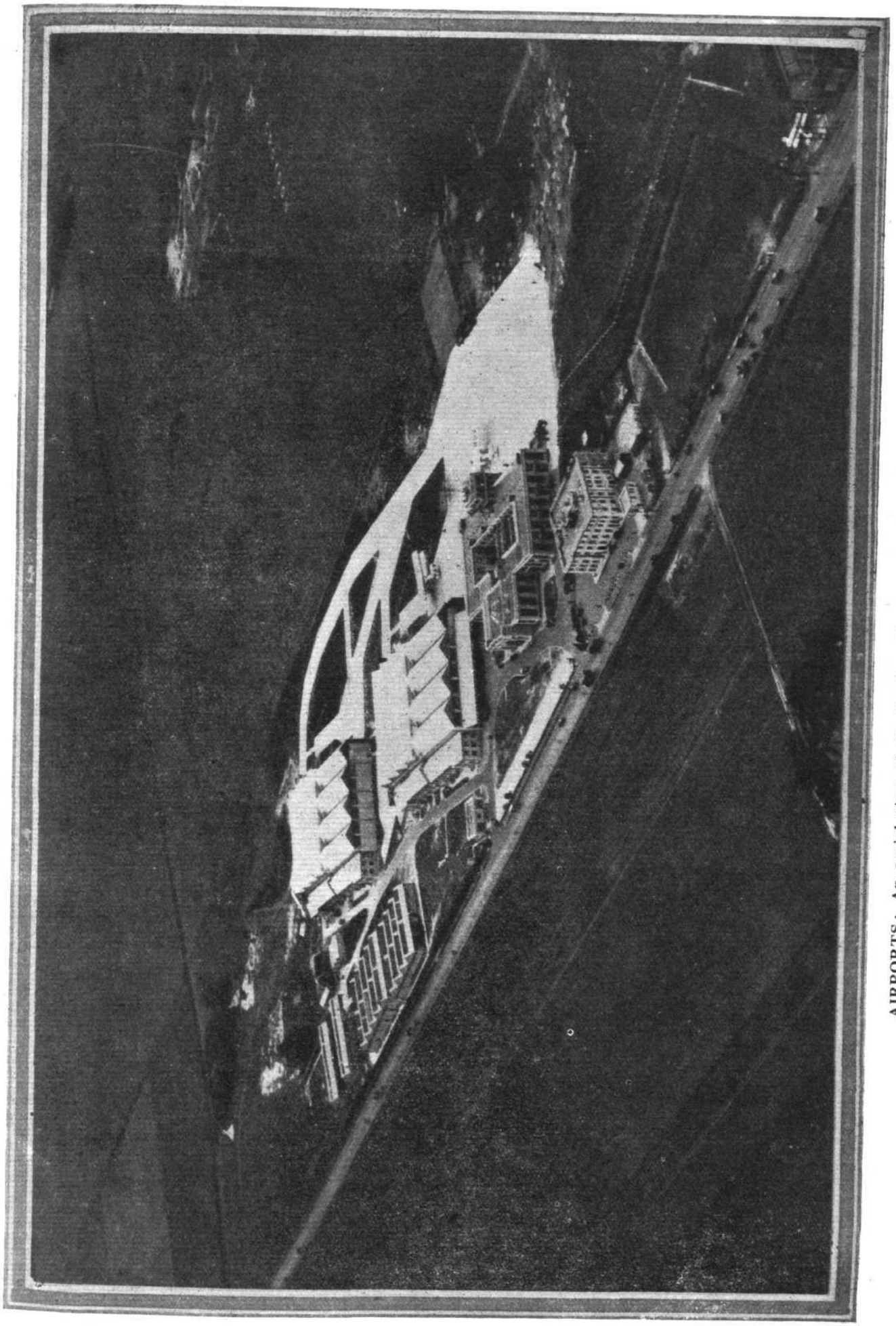
There can be little doubt that municipal authorities will be well advised to make provision for an airport within reasonable distance from the centre of the town, which should not be far distant from a railway station, 'bus or tram centre. One of the reasons why it is suggested that provision should be made is that the building developments may increase so rapidly that land which would probably be ideal as an airport may be laid out or built upon, and by this means lost for the purpose which it would be so evidently suited for.

Town Planning

Where a local authority is preparing a Town Planning Scheme they should seriously consider the allocation of an area as one of their first problems, because the popularity of the aeroplane for business or pleasure purposes will develop on lines which it would be difficult to illustrate except by referring to the effect that has resulted from the remarkable growth of the motor car. Through the public accepting the motor vehicle for both business and pleasure purposes, the roads which were more or less satisfactory for horse-driven vehicles, have had to be widened and improved, and new roads have had to be constructed at a cost of many millions in order that these vehicles may be used to their full capacity and with safety to the public.

Comparison with Motor Car

The motor car, 20 years ago, was ridiculed, but today it is the recognised means of transport. It is not suggested that the aeroplane will have a similar widespread popularity. There can, however, be no doubt that it will become to an increasing degree a popular means of transport, and the omission of the provision of an airport or safe landing ground would prove a deterrent to its development. It may be the case that the Government will either encourage or even compel local authorities to provide them for the reason that they are unlikely in most cases to be profitable, that is to say, the revenue obtainable from all sources, would not be sufficient to cover the amount involved in the interest and sinking fund on the capital expended in the purchase and preparation of the land, and the wages of a man who would, for example, merely act as groundsman.



AIRPORTS: An aerial view of the London Airport at Croydon. (*Photo.: Aerofilms*).

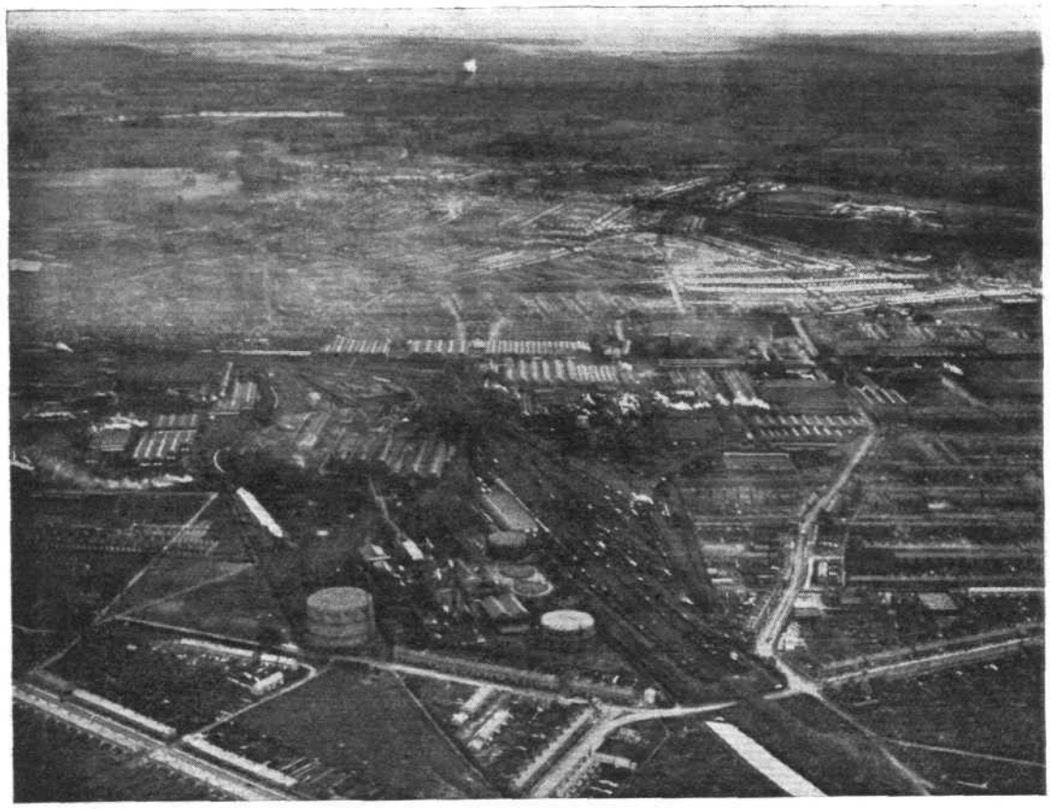
Reasons for Airports

It is a question whether a return in cash is the right method of viewing the matter. If the town is a business centre or likely to develop into one, then the airport would be a source of assistance because its very existence is an advertisement of the town, bringing traffic and business in a similar manner as would be the case by the provision of a railway station, which, in most cases when first installed, does not reimburse from any revenue received, the interest on the capital cost of the station buildings, quite apart from its upkeep and the cost of the stopping of trains at the stations. Once, however, it is in existence, business is brought to the district, traffic is encouraged, and so it will be wherever airports are established.

the more aeroplanes that are used for passengers and goods, the fewer motor cars will be required to use the roads, while the greater number that use the air necessarily brings an increased revenue to the owner of the airport.

British Airports*

At the present time there are exceedingly few airports in the British Isles, and particularly as compared with what is the case on the Continent, *i.e.*, in Germany, France, etc. In various parts of the country Flying Clubs are actually established and amateurs being trained as pilots. There are other areas where clubs are springing up and acquiring a membership, but they are in difficulties because, although they may acquire a machine and use a field which may be just capable of use as a landing and taking off area for the machine under



Landmarks: Some towns may be recognized from the air by certain characteristics—this view of Swindon, for example, with the railway and gasometers showing up prominently.

Private Airports

Private persons will only in exceptional circumstances instal airports for the reason that they could not see interest on the capital involved for some years; they are not interested in bringing business to a district unless they can see a profit for themselves; it is therefore either a local or a national matter, and strictly speaking, more local than national.

Municipal Airports

It cannot be a serious hardship to a local authority to own, say, 100 acres of land for this purpose; if it is reasonably even or level, then there is no great cost in excess of the purchase. All it requires beyond this is that every obstruction such as trees, fences, &c., should be removed, ponds filled up, and the limits of the land defined by distinctive marks.

A licence will be granted by the Air Ministry for (1) light machines if the runways are of a certain length and width, or (2) if the area be sufficiently large, for all machines; the latter is the general licence for public use.

Revenue

If there should be sufficient usage of the area, then a hangar may be built, and a charge would be made on every machine using it. A petrol tank would also be installed and the profit from the sale would be another help towards paying the expenses of the upkeep of the air port. The Air Ministry does not make it a condition of the licence that there should be anything provided beyond the ground and the condition of the surface.

Roads v. Air

It will be seen that in comparison with the cost of widening, improving, and the provision of new roads for the use of motor cars, the cost of installing an airport is small and trifling. In the last resort, if there was no demand for it, the land would be available for resale probably at an improved value.

There is also one other feature, admittedly a small one; certain weather conditions, they cannot do more than fly round the district and come back to the one area in question, or if they are competent, fly to one of the few established airports which may be far from where they desire to go.

Airports for Health Resorts

Every seaside and country health resort should establish an airport as soon as possible. One can contemplate with confidence that members of a flying club would, knowing of these airports and desiring to try their skill, be more likely to use these than those of another town—just as the owner of a motor car at the week-end uses his car to take himself and his family for a run to the seaside or country resort.

A business man would possibly be encouraged to have his residence at the seaside or in the country district near which is an airport. He could spend, if necessary, longer hours at his business.

There may be a general idea that the aeroplane is only useful for long distance flights; this would be gained from the spectacular effects that have been demonstrated from such flights as that of the R.A.F. machine in its non-stop flight to India, from those of Sir Alan Cobham and Lady Bailey to Africa, and from others that are daily becoming more numerous and instructive. There is some justification for this view; one can conclude that if an airport is 4 or 5 miles out in the case of two towns which are distant from each other by say 20 miles, the time and trouble in getting to the aerodrome at one end, using the machine to carry the individual the 20 miles, and the time taken to arrive at the ultimate destination, may prove to be more than it would take to cover the whole distance by motor car, although this would depend on whether the roads were narrow or congested, and the speed of the car thereby limited. Where, however, the distance is 50 miles or over, the advantage would be greatly in favour of the aeroplane.

* A list of these will be given in the Appendix.

Business Appointments

Recently a well-known aviator at 3 p.m. concluded an interview with the writer in Blackpool (which is about 230 miles from London), and said that he had an appointment in London at 5.30 p.m. He left in his machine a few minutes after, and had no difficulty in keeping the appointment to time. In another instance, being at an aerodrome near London, a member of the firm sent for his partner from Hull, who arrived two and a half hours afterwards on a light "Moth" machine.

A business man can leave a town in the North of England at 10 a.m., be in London at about noon, conduct his business over a period of three to four hours, and be back at his own town by 6 p.m., and at a cheaper rate than he could do it if travelling by other methods of transport when he would have to stay the night at an hotel and return next day, thereby losing a whole day's services.

Safety Appliances

The question of the safety of passengers in aeroplanes may be one of those matters that are brought forward, but the loss of life from a passenger-carrying aeroplane is extraordinarily small compared with any other form of transport. The Imperial Airways record is one that they are deservedly proud of. The safety device which is known as the slotted wing, which prevents a machine from getting out of control, should be fitted to all passenger 'planes, and it would be wise similarly, to provide all 'planes used by owner-pilots with this device. This is not the case because the machine is not otherwise safe in the hands of a capable pilot, but any device which, in the opinion of the Air Ministry, is acknowledged to give an added degree of safety should be part of and necessary in the construction of the machine that is to be used in the air, just as a ship is provided with lifeboats; confidence is established in this way.

Difficulty for Large Towns

The difficulty that most large towns will encounter will be that of selecting an area required for a modern airport within a reasonable distance from the centre of a town. If a suitable spot is chosen and it is four miles out in a certain direction, it will be eight miles, probably, from the opposite end of the town. The London airport is at Croydon in the south, which is about 12 miles from the city. A private airport has been established at Heston in the west, which is somewhat less in distance, and there is another in the north at Hendon. Most large towns are built up to such an extent that it is impossible to acquire an area as near to the centre as could be desired and as would ordinarily be required, but the motor car, 'bus or tram, or local rail service is of great assistance in conveying the users of the aeroplanes to their destination. The means of access and conveyance should therefore not be lost sight of when selecting a site for the airport.

Site and Selection

The site should not wholly be considered from the fact that it is level and, to the inexpert, apparently all that will comply with the requirements set forth in the memorandum of the Air Ministry.

The selection of a site is a matter that requires very careful consideration. It will be gathered from what has been stated above that the ground should be reasonably level, no part of the area should have a gradient of more than 1 in 60. It should be either already properly drained or be capable of being satisfactorily drained and kept free from water under all weather conditions. The land thould be, if possible, on a slight plateau, that is, with the surrounding land somewhat lower than that of the site itself.

Drainage

It is generally the view that an airport when it becomes extensively used, *i.e.*, under very heavy traffic conditions, will have to be covered with an impervious surface such as concrete, tar macadam or other composition, and the amount of water collecting on such a surface under heavy rain conditions would be a problem that should be visualised as a future problem; in consequence, a saucer-shaped area is not necessarily a suitable site from this aspect.

An experienced pilot may advise from a landing and taking-off point of view; and while this is of primary importance, there are still to be considered the practical difficulties, one of which is mentioned above, and there may also be others, such as cost of the land and cost of preparation.

Effect of Taxying

The average machine that uses the airport will be, comparatively speaking, light in weight. A machine of 3 to $3\frac{1}{2}$ tons will at the present time carry 10 to 12 passengers; it is strong from an air point of view, although it may appear to be composed of light material. This machine has to taxi over the ground at very high speed, *i.e.*, up to 60 or 80 m.p.h., and the usual number of wheels used to travel over the ground is two, so that if there are any parts of the ground which are likely to cause uneven running, it will have the tendency to damage the machine to a much greater extent than would apply to a motor car passing over the same ground. The taxying over the surface of the airports on which the machine lands does more to deteriorate the life of the machine than thousands of miles of flight in the air. It is therefore of great importance that the ground should be even and regular and kept in this condition.

Aeroplane v. Motor Car. Tractional Resistance Compared

It will be gathered that the aeroplane which takes off and lands on the airport does not use the ground in the same manner as a motor car. In the latter case the power of the engine is transferred to the wheels and there is considerable tractional resistance between the wheel and the ground, which, if it is in a soft condition and not able to resist the force which the wheel is applying, the wheel will revolve without propelling the car forward. In the case of the aeroplane the power of the engine is transferred to the propeller, and immediately there is sufficient pressure of air the machine will begin to move forward, the wheels simply rolling over the surface; the 'planes take up whatever lifting power the propeller gives, and with every mile per minute increase the weight is being taken off the ground. The ground effect on the speed is reducing from the commencement and with the increase of speed. Similarly, when the 'plane is landing exactly the reverse takes place: the wheels roll over the surface; it is the brake on the tail of the machine that pulls the machine up. This brake is sometimes in the form of a flat iron or steel-shod drag which ploughs up the soft ground.

Concrete Runways

It will be understood that if the runway was of concrete or some other form of impervious surface, this form of drag or brake would not have the same stopping power to the machine as would be the case with soft ground. There are, however, other forms of brakes in use, and the problem of the braking of aircraft is now receiving renewed attention on the part of designers.

In order to minimise the damaging effect on the machine by taxying over the surface, it has been planned in some cases to concrete a circular track from the hangar round the outer rim of the airport so that the taxying can be done on a good surface to and from the hangar, and when the machine reaches the point where it is advisable it should take off from, the track is left and the machine traverses the turf covered runway.

Physical Conditions

The physical conditions surrounding the site form an important item in the selection. A site that is less level than another may be more suitable if it has open spaces surrounding it. The openness of the surrounding areas means that the height of any trees, houses, buildings, monuments, hills, rising ground, etc., should be sufficiently far from the airport area that the machine has not to negotiate these obstructions when taking off or landing. Rising ground or deep depressions may render a site unsatisfactory because the air currents may be very troublesome. It is therefore advisable that an experienced pilot should examine all these factors and report on the conditions under the directions of wind which prevail in the area, and while a light machine may be used to secure the information, it is more desirable that a heavy machine should be employed for the purpose.

It is obviously the proper course that as much information should be obtained as possible so that the aerodrome should be on a suitable site for all time, and that it should have the reputation of being most satisfactory from all points of view. The writer in several instances has heard of aerodromes which are of such a character that pilots would prefer to land elsewhere than upon them under certain directions of the wind. In some cases adverse comment refers to the position of the hangars; in other cases, the aerodrome is close to a hill or deep depression on one of the sides of the site, causing either an up-current of air or air pockets, which are unpleasant characteristics to have near a landing ground.

Prevailing Winds Record

Before selecting a site, it is equally necessary to have a record of the prevailing winds in the district over a period of 5 years. These can be obtained from a meteorological

station. Below is a table which gives the winds prevailing in the Blackpool area over a period of five years.

Year.	East.	West.	North.	South.	N.W.	S.E.	S.W.	N.E.	Calm.
1928 ..	45	60	16	44	32	52	68	23	26
1927 ..	55	65	20	31	44	64	53	15	18
1926 ..	52	59	18	37	40	64	61	23	11
1925 ..	35	62	22	38	59	53	58	31	7
1924 ..	45	61	13	36	33	80	75	20	3
	232	307	89	186	208	313	315	112	65
Average	108		55		104		85		13

The table is divided into four series covering eight different directions of the wind, with one for calm weather. It is done in this manner because the runways applying to one direction will be equally available for the wind in the opposite direction.

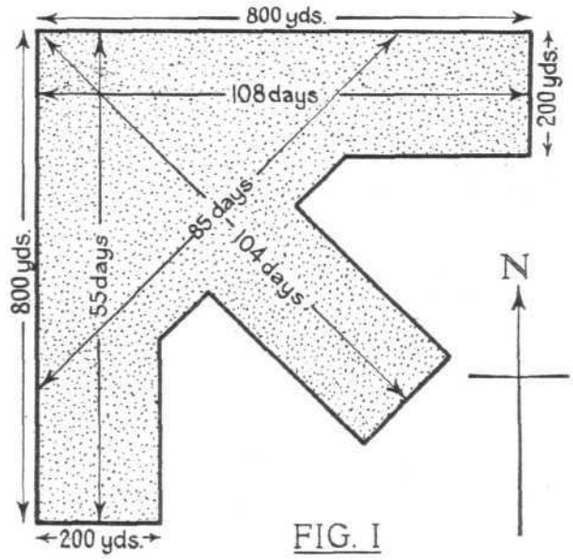


FIG. 1

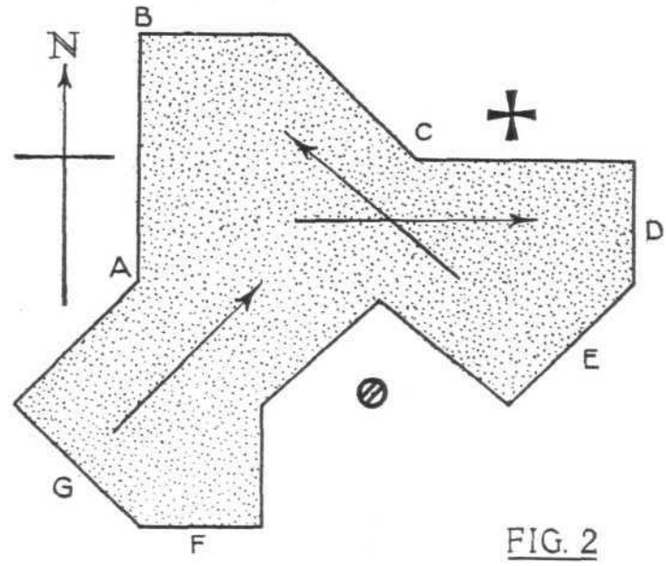


FIG. 2

It will be seen that with the assistance of such information indicated in the above Table, if a suitable area of land does not, owing to the physical conditions of the area, permit of a provision for every possible wind direction, which would entail an area of 154 acres, the land need not necessarily on this account, be abandoned. There may, on the area, be found runways in the direction of these prevailing winds on about half that area, viz., 77 acres. Figs. 1 and 2 show, respectively, two areas of this acreage which would provide the necessary runways to suit the winds in the table.

Elevation of Buildings Surrounding Site

The elevation of any building or obstruction of any kind should be examined, and any building likely to be erected on surrounding land must be taken into consideration. If the land surrounding the proposed site is on the same level as the site, and there are no restrictions as to the height of buildings, it may be assumed that any purchaser of such land could erect buildings 40 to 50 ft. in height on this area. This is quite probable, especially if the airport becomes a business-like proposition and air transport of goods becomes a commercial asset.

Obstructions

Manufacturers of goods would establish their works surrounding the airport itself. The height of these buildings under such circumstances would affect the effective flying area of the airport, and where a line taken from the topmost point of any such building at a gradient of one in ten touches the site, this point will be the limit of the effective area.

It might almost be said to be the case that a landing area on a plateau has a greater area than where the airport is in a hollow, because in the average case the pilot will practically have obtained flying speed when he reaches the boundary, whereas if he is approaching rising ground he may have to travel a further distance, but if it is on falling ground, he may not require it.

Licence for "Light" and All Machines

The above particulars having been obtained, an examination of the Memorandum from the Air Ministry discloses the fact that a licence for light machines can be obtained if the airport has runways of 400 yards in every direction, and for all machines the site should have runways of at least 600 yards.

The writer has discussed the questions of the dimensions and other particulars of aerodromes with many of the well-known pilots of the country, and it is particularly gratifying that they have so willingly expressed their opinions from a flying point of view, although there seems to be a difference of opinion in several particulars, they are as one man unanimous that there should be plenty of space available—as much as possible—they do not say definitely what space is the desideratum, but it is quite clear that the Air Ministry's area is, as stated, the minimum, and is none too large.

Dimensions of Airport

A Dutch aviator regarded a certain aerodrome as on the small side—although it was given to the writer as 1,200 yards long. A British pilot referred to the case of a machine which did not take off before it had travelled 1,250 yards. They point out that heavy machines of special design can possibly take off within 300 yards and probably the future design will enable the airports to be less in area; even then, it is not the highly-skilled pilot or the specially-designed machine that the airport is to cater for, it is for all conditions of machines and all classes of pilots, therefore the ground should be made to enable these pilots to land safely under all weather conditions, and if he makes a slip, he can, in the area available, reasonably recover his stability.

Having regard to the Memorandum above-mentioned, which gives a licence for all machines having a runway of 600 yards, it must be evident that any machine that is known to require a length of 1,200 yards for a take off would never attempt to land and take off on the average airport so licensed unless forced to do so, and it is abundantly clear that it will be up to the manufacturers of aeroplanes, and pilots, to recognise that they will be expected to have machines that will not require a greater length of runway. The Air Ministry equally prefer the runways of greater length—1000 yards is mentioned if it is possible to obtain these lengths without serious inconvenience in cost. If we are to take as a pattern the airports in America and on the continent, the airport of these larger dimensions is the rule.

The land in or near to towns in this country is not probably of so level a character or of such extent as it is abroad, and doubtless the Air Ministry has had to take this into consideration when issuing their Memorandum giving the minimum dimensions of the runways.

(To be continued)

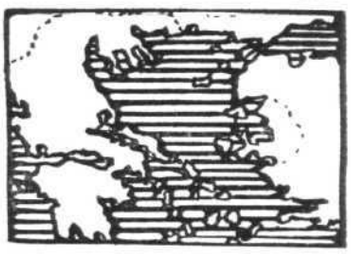
◈ ◈ ◈ ◈

An Airport for Victoria, B.C.

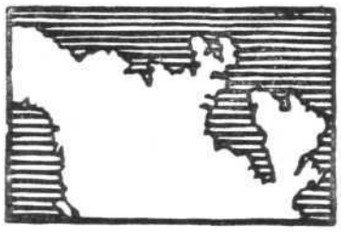
WITH a view to creating a seaplane airport in the harbour of Victoria, the city has already taken preliminary steps leading to the preparation of plans. A hangar facing the water with a ramp in front, and provision for electric power and refuelling were some of the suggestions contained in a communication to the city council regarding this scheme.

AIR FORCES *of the* WORLD *choose* MOTH *for Training*

GREAT BRITAIN
Royal Air Force



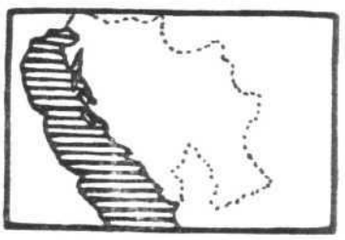
GREECE
The Greek Naval Air Service



CANADA
The Royal Canadian Air Force

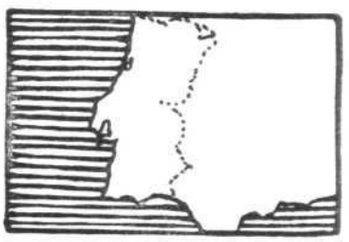
DENMARK
The Danish Royal Air Force
and Naval Air Service

AUSTRALIA
The Royal Australian Air Force



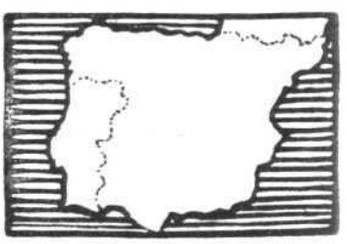
JUGO-SLAVIA
The Jugo-Slavian Ministry of War

NEW ZEALAND
The New Zealand Ministry of Defence

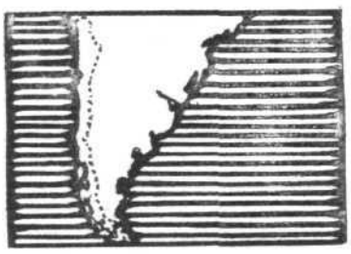


PORTUGAL
The Portuguese Naval Air Service

IRELAND
The Irish Free State Army Air Corps



SPAIN
The Royal Spanish Air Force



CHILE
Chilean Military
Air Force

THE DE HAVILLAND AIRCRAFT CO., LIMITED
Stag Lane Aerodrome
Edgware, Middlesex
Telegrams: Havilland-Phone-Edgware
Telephone: Edgware 0171

THE DE HAVILLAND AIRCRAFT OF CANADA, LIMITED
Sterling Tower
372 Bay Street, Toronto 2
Canada
Telegrams: Moth, Toronto

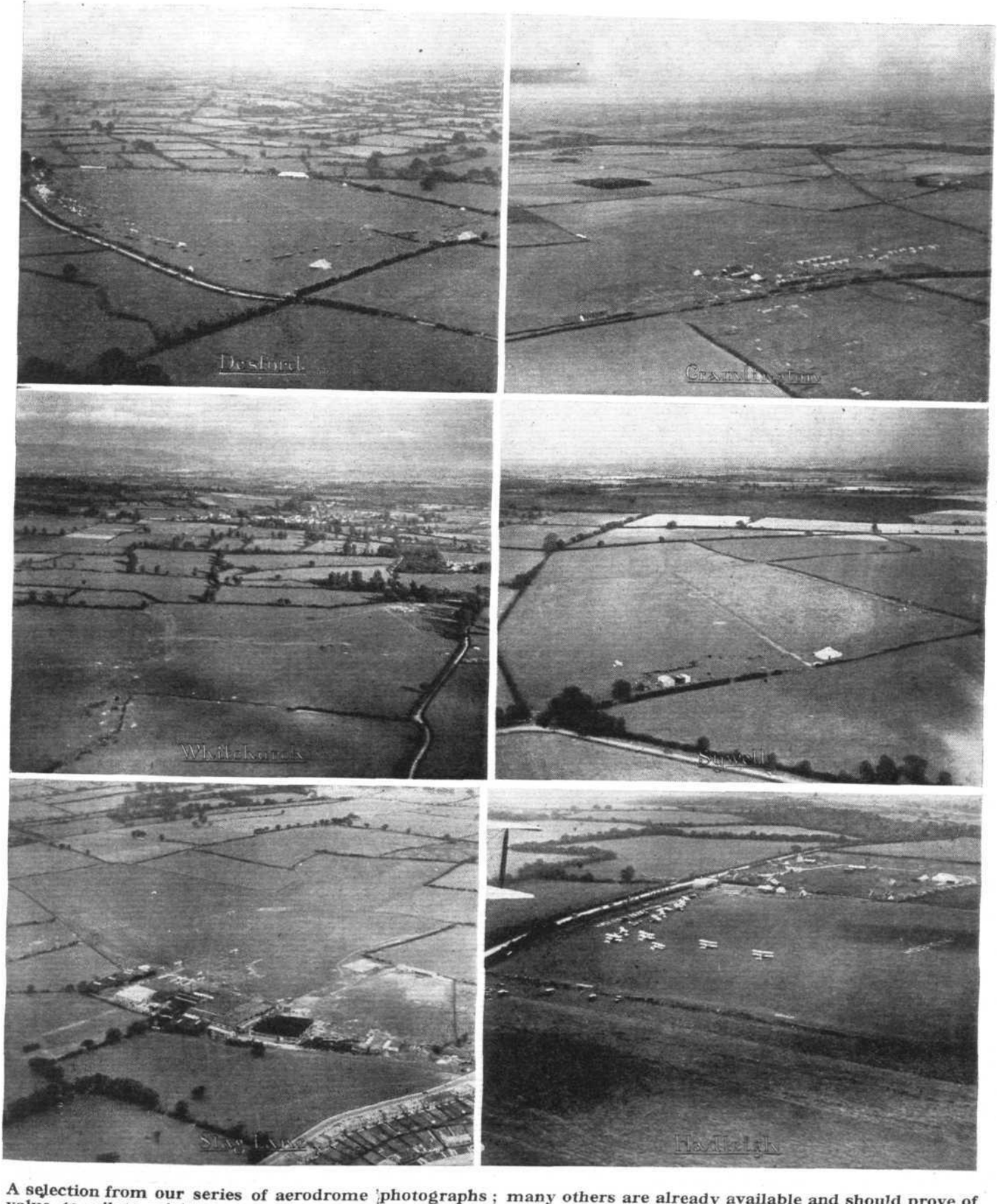
THE DE HAVILLAND AIRCRAFT PTY., LIMITED
Whiteman Street, South Melbourne, Australia
Telegrams: Moth, Melbourne

MOTH — THE WORLD'S PREMIER TRAINING AIRCRAFT

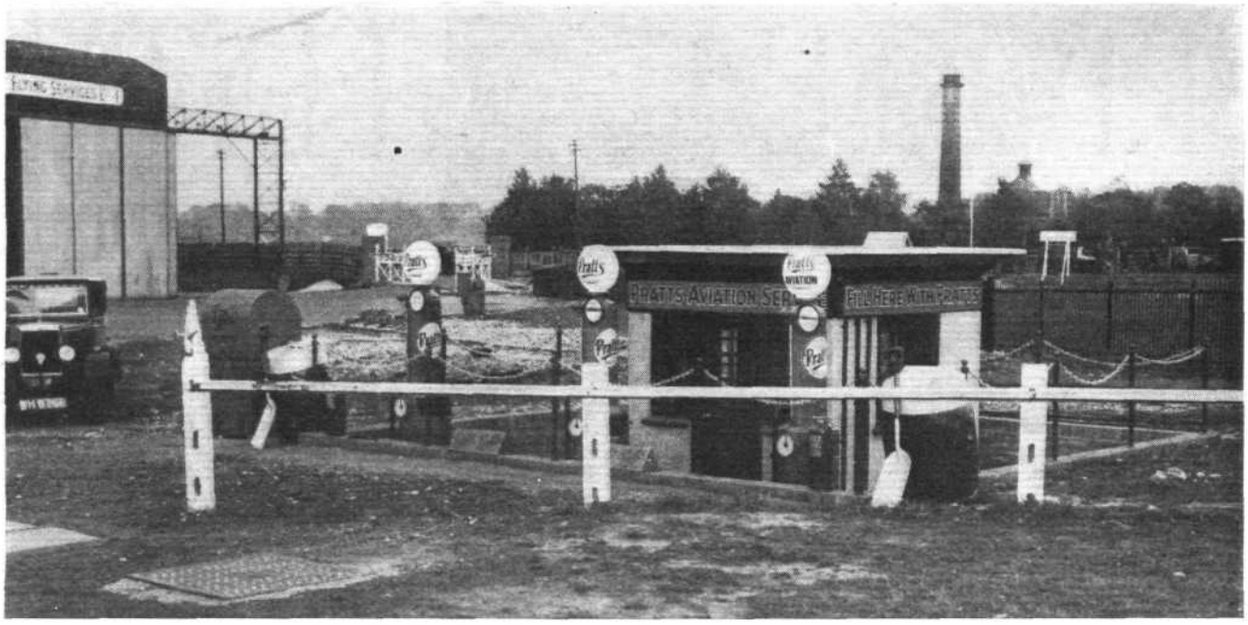
PRIVATE FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

"SHOW ME THE WAY TO GO HOME!"



A selection from our series of aerodrome photographs; many others are already available and should prove of value to pilots wishing to see these aerodromes from the air. Full-sized prints may be had on application to this office.



A typical Service Station showing the pumps, service pits, and lubricating oil cabinet as run by Pratts at Croydon. (FLIGHT *Photo.*)

FUEL AND OIL SUPPLY FOR THE PRIVATE OWNER

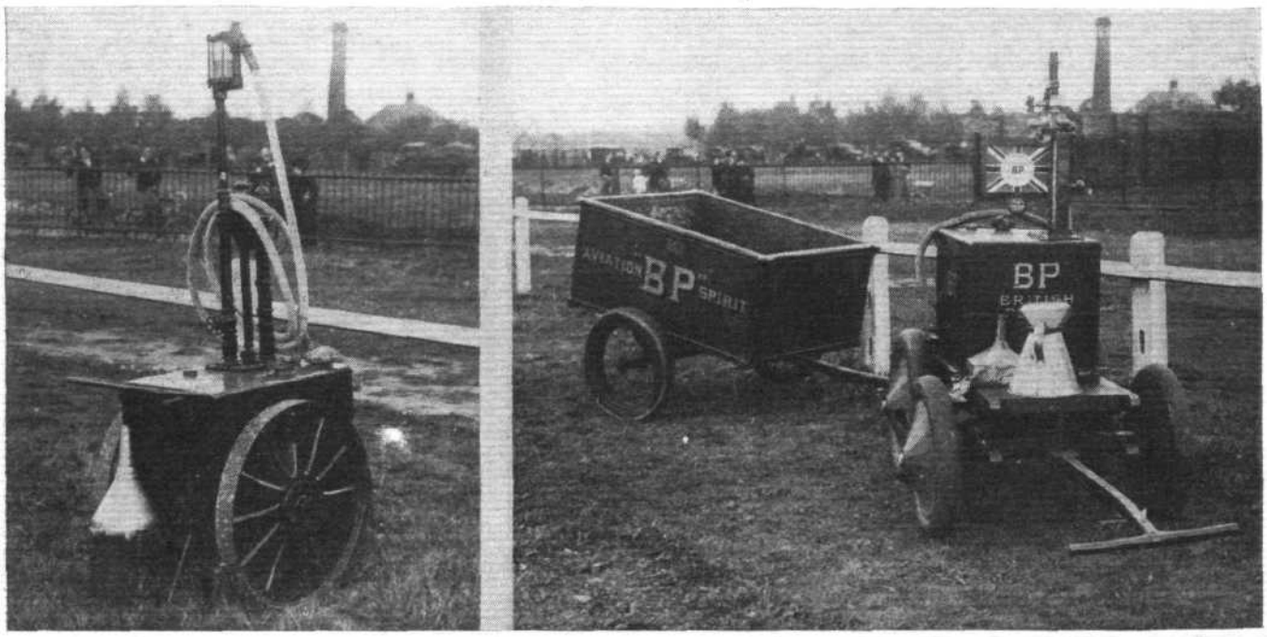
THE facility with which petrol and oil is obtainable has played a very large part in the rapid growth of the number of car owners to be seen on the road today; were it not for the fact that petrol filling stations are available almost every few miles along all our main roads and at very little greater distance even on other roads, there is no doubt that small cars with their limited fuel capacity would never have reached the popularity they have done.

This is much the same in the air, and particularly is it so with regard to light aircraft. Following the rapid growth in the use of light aeroplanes, which has been a prominent feature of the last few years, the manufacturers and distributors of fuel and lubricating oil have vied with each other in their efforts to provide adequate supplies of their respective products at all points where aircraft are likely to require them.

Not only have they set up pumps at the main aerodromes, but also they have backed-up all the flying meetings with a system of service which has played a very important part in the success of these meetings. It has been said that without the co-operation of the petrol companies there would have been no meetings; this may be a slight exaggeration, but there is undoubtedly more than a modicum of truth in this assertion. Those who have had the good fortune to attend such meetings know only too well the spirit of good-fellowship which has pervaded the organisation of all such firms on these occasions.

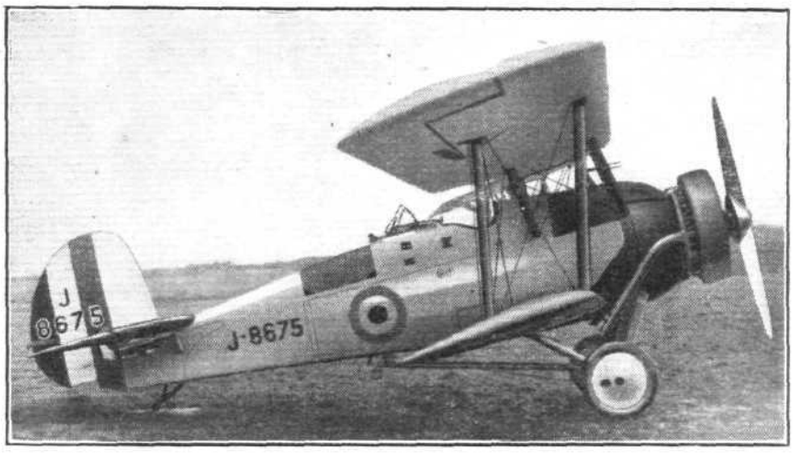
However, it is not only in such realms that they have catered for the wants of aircraft users; when a flight is planned across country or even to the farthest distant foreign lands, the pilot knows that at predetermined points he will be sure of getting adequate supplies of his chosen brand of fuel or oil.

On aerodromes and at air ports the supply of fuel and oil is, of course, of prime importance, and the systems used by the various firms vary with the particular case in hand. Pratts Motor Spirit Co. have, for instance, established regular service stations, such as are becoming a feature of our roads,



Portable pumps for fuel. Left, Shell; right, B.P. (FLIGHT *Photos.*)

ARMSTRONG WHITWORTH
AIRCRAFT



THE ALL-STEEL ATLAS
(ON WHEELS, FLOATS OR SKIS)

THE all-steel Atlas is the best aircraft for land or sea reconnaissance.
It is the standard Army Co-operation two-seater of the Royal Air Force.
Its steel construction accounts for its unrivalled durability and ease of maintenance. Fitted with the world-famous Armstrong Siddeley Jaguar engine (plain or geared type), its speed, climb and ceiling fulfil the severest Service requirements. It is produced on the grand scale by the best equipped aircraft works in Europe.

PERFORMANCE FIGURES
ATLAS WITH JAGUAR ENGINE AND TOWNEND RING

Fuel, 75 gallons (337 litres). Oil, 7 gallons (32 litres). Military Load, 880 lbs. (400 kgs.)

	Plain Engine.	Geared Engine
Approx. total weight	4000 lbs.	4115 lbs.
	1820 kgs.	1870 kgs.
Speed at ground level	143.5 m.p.h.	149 m.p.h.
	231 km.p.h.	240 km.p.h.
" " 5000 ft.	139.5 m.p.h.	145 m.p.h.
" " 10000 ft.	134 m.p.h.	140 m.p.h.
" " 15000 ft.	125 m.p.h.	131 m.p.h.
" " 1000 metres	226 km.p.h.	236 km.p.h.
" " 3000 metres	216 km.p.h.	225 km.p.h.
" " 5000 metres	193 km.p.h.	204 km.p.h.

	Plain Engine.	Geared Engine.
Time to 5000 ft.	5.25 minutes	4.25 minutes
" " 10000 ft.	12.5 "	10.5 "
" " 15000 ft.	26 "	21.75 "
" " 1000 mtrs.	3.5 "	2.5 "
" " 3000 "	12.5 "	10.25 "
" " 5000 "	34 "	27.5 "
Absolute Ceiling	19000 ft.	19100 ft.
	5800 metres	5830 metres
Service Ceiling	17300 ft.	17700 ft.
	5280 metres	5400 metres

Maximum allowable R.P.M. 2200. Normal R.P.M. 2000

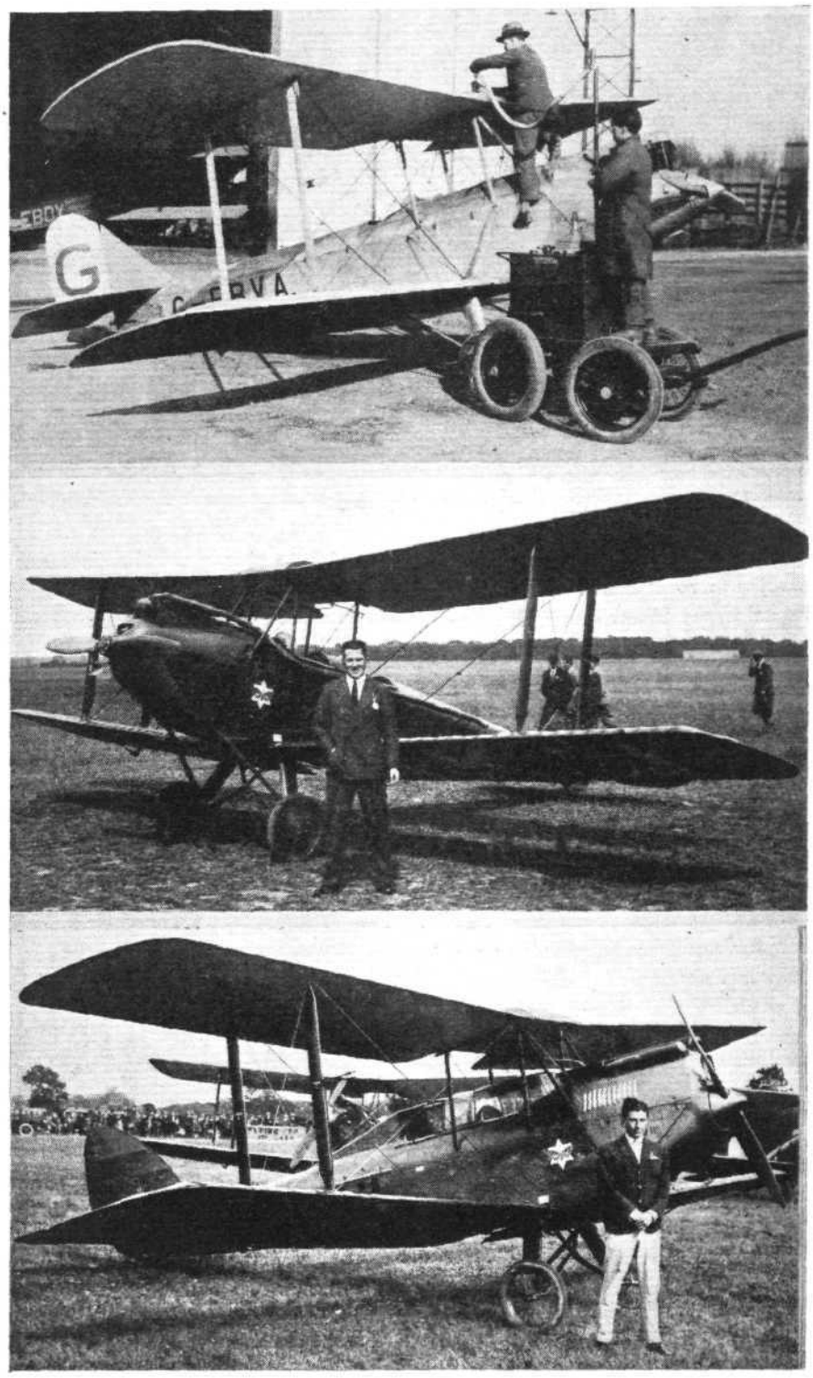
SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT LIMITED
Works and Aerodrome: Whitley, Coventry. London: 10 Old Bond Street, W.1

at three different aerodromes where the demand for spirit is large. At these stations pumps have been erected from which all types of fuel may be obtained, and an attendant is always on duty.

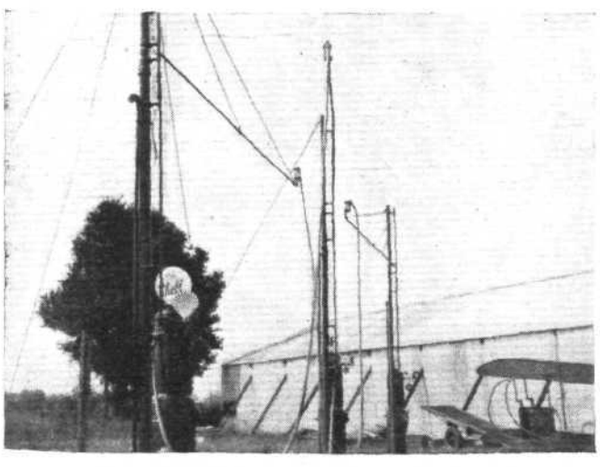
At the smaller aerodromes all the main petrol companies have, as a general rule, a pump of the usual type, and this is in many cases backed up by a portable pump, such as those of the British Petroleum Co. and Shell-Mex, Ltd., shown in our photographs. The actual delivery from the pump varies according to the requirements of the case: in some cases a large swinging arm is erected for the delivery hose, which can be swung back out of the way when not in use and is at the same time, of sufficient height to clear the top of the planes, and thus make refuelling easy; the other type is the underground pit on the aerodrome having in it a long hose through which the fuel is delivered by an electric pump situated in a convenient shed or near the storage tank. The old method of filling from cans is, of course, only used where pumps are not available, such as at small flying meetings, in which case all companies always have lorries with adequate supplies, or else when dumps are arranged to be placed for the convenience of someone who is making a long cross-country flight.

For the supply of lubricating oil the methods are again somewhat varied. Pratts and Shell arrange for their products to be available in the cabinet type of supply pump; in this case the particular grade of oil required is pumped into a can and then poured into the engine sump or tank. C. C. Wakefield & Co., who supply Castrol brand oils, and also Shell-Mex have another type of mobile pump which saves the journey between the machine and the pump which is necessary with the fixed cabinet. In this type a semi-rotary pump is mounted on top of a 50-gall. reservoir and the whole outfit can be wheeled out to the machine and the oil delivered through the flexible hose.

Alexander Duckham, whose Adcol aero oils are becoming well known, have still another form of pump which has been installed on many aerodromes. In this type a drum of each of their mineral and castor oils is mounted on a carriage and direct measuring pumps are placed in them so that the oil may be pumped direct into the engine sump or oil tank. This particular form is probably the most mobile of any, as the whole outfit can easily be transported on the back of a car,



Service. Top, B.P. refuelling an Avian from one of their portable pumps. Middle, Flt.-Lt. T. Rose, a Pratts' representative, with his Moth (Cirrus III). Below F./O. T. Wheatley, a Shell representative, with his Moth (Cirrus-Hermes). (FLIGHT *Photos.*)



The high swinging arm type of fuel pump as installed at Reading.

and when on the aerodrome or landing ground it can be readily taken to any machine as necessary and it saves the trouble of constantly opening cans when only small quantities are required.

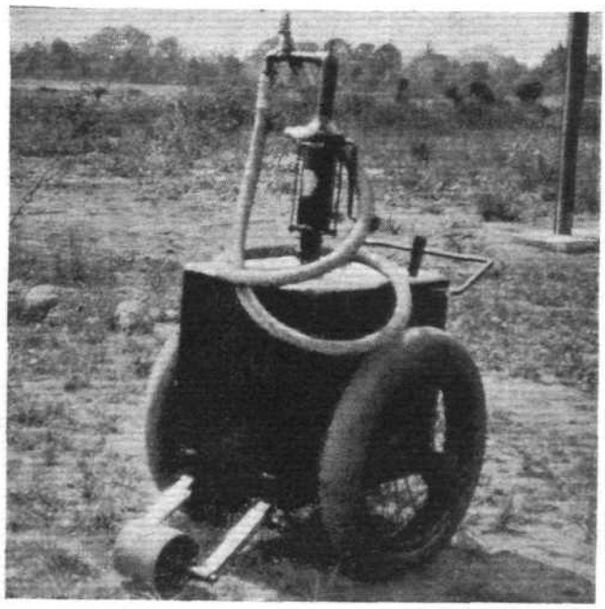
Another part of the organisation which has a direct bearing on the whole problem is the transport of the firm's representatives to the scene of action. Shell-Mex and Pratts run aeroplanes for this purpose, and these machines have become quite a feature of the meetings during the past year. The B.P. Co. and the oil companies always have their representatives there in a car, and many are the pilots who have been thankful to take advantage of the cheerfully offered lifts to the neighbouring town. Both the aeroplanes and the cars are readily used by their pilots and drivers for the success of the meetings, and there can be few firms whose salesmen are better organised or whose representatives work

A. Duckham & Co.'s method of supplying their Adcol Oil.

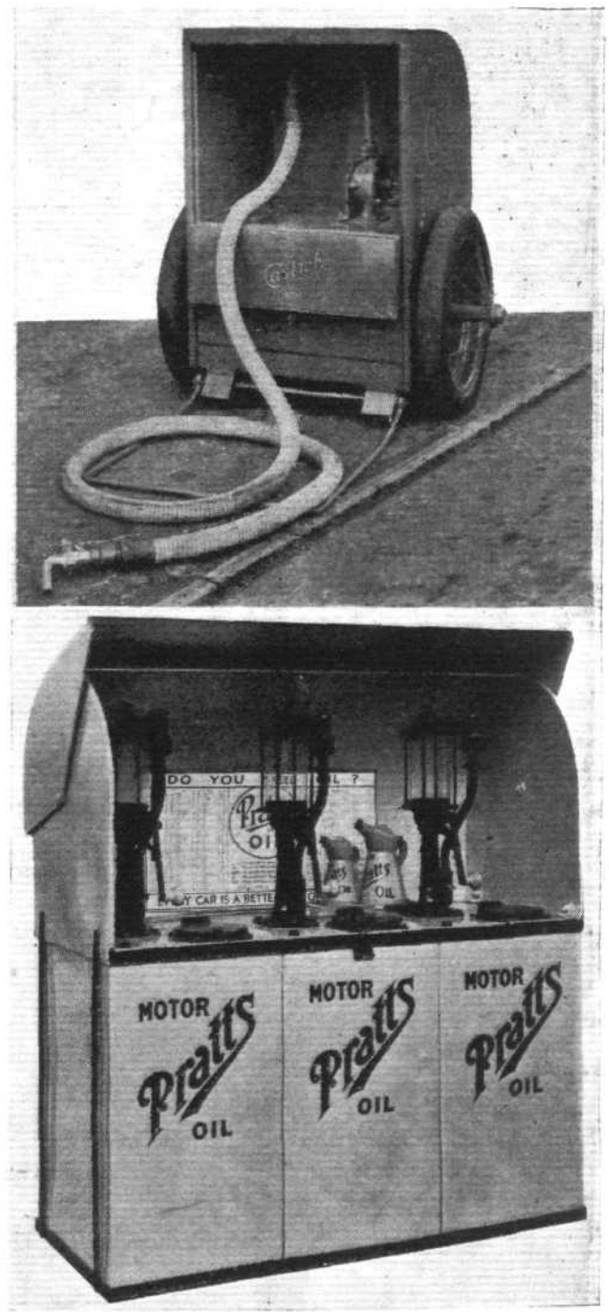
harder not only to sell their products, but also to give real service to their users, than those of these firms. Little can be said here about the actual fuel or oil or about the merit of that supplied by the respective firms, but users may rest assured that there is little which goes on in connection with engine developments which is not made full use of by the research and technical departments of these firms and that they invariably get the benefit of such research as soon as there is any chance of their doing so.

There is still one form of supply station which, although there is no great demand for it as yet, may be called for before very long, and that is a system whereby seaplanes and flying-boats can be refueled afloat. First, there might be a motor barge that would be capable of being run up to the same buoy as that at which the seaplane was lying, and having on board a fuel pump with a long delivery pipe working on the same lines as those used from servicing pits like that which has recently been installed at the Supermarine Works at Hythe. Then in some harbours one might have an overhead gantry to which the planes could tie up while floating underneath or, say, a bridge, which would answer the same purpose, and the fuelling lines could then be led straight down from above. There is a growing interest in seaplanes and we may have seaplane meetings as we have been having landplane meetings.

One possibility which might worry the companies may be the question of refuelling machines in flight, but before that day arrives we may have even arrived at, as is foreshadowed in German experiments, the wholesale use of rockets in which case Messrs. Brock & Pain will probably be vieing each other in designing service stations!



A Shell oil pump.



Fixed and mobile oil cabinets.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.

Bristol and Wessex Aeroplane Club, Filton, Gloucester. Secretary, Major G. S. Cooper, The Aerodrome, Patchway, Glos.

Cinque Ports Flying Club, Lympne, Hythe. Hon Secretary, R. Dallas Brett, 114, High Street, Hythe, Kent.

Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.

Lancashire Aero Club, Woodford, Lancs. Secretary, Mr. Atherton, Avro Aerodrome, Woodford.

Liverpool and District Aero Club, Hooton, Cheshire. Hon. Secretary, Capt. Ellis, Hooton Aerodrome.

Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, John Bell, Cramlington Aerodrome, Northumberland.

Norfolk and Norwich Aero Club, Mousehold, Norwich. Secretary, G. McEwen, The Aerodrome, Mousehold, Norwich.

Northamptonshire Aero Club, Ltd. Hon. Sec., P. Hayward, 19, Market Square, Northampton. Aerodrome: Sywell Aerodrome.

Nottingham Aero Club, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., 30, Park Row, Nottingham.

The Scottish Flying Club, 101, St. Vincent Street, Glasgow. Secretary, George Baldwin, Moorpark Aerodrome, Renfrew.

Southern Aero Club, Shoreham, Sussex. Secretary, Miss N. B. Birkett, Shoreham Aerodrome, Sussex.

Suffolk Aeroplane Club, Ipswich. Secretary, W. J. Offord, The Aerodrome, Hadleigh, Suffolk.

Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

CINQUE PORTS FLYING CLUB, LTD.

(OCT. 12-19).—Total for week: 24 hrs. 50 mins. Dual instruction: 8 members, 9 hrs. 30 mins. Advanced dual: 3 members, 2 hrs. 15 mins. Soloists under instruction: 2 members, 45 mins. "A" pilots: 5 members, 8 hrs. Tests and joyrides: 9, 1 hr. 35 mins.

The club re-opened on Wednesday, 16, and Mr. Brown proceeded to put in no less than 24 hrs. 50 mins. in the four days ending Saturday, 19. By great efforts, Mr. Fortiscue succeeded in completing the extension to the club room in time for the re-opening, and the work is most satisfactory.

Mr. R. Temple Harris, Lieut.-Comdr. Goble, R.N., and a new member from London, who prefers to remain anonymous, were new members commencing instruction on the re-opening of the club, and Mr. Franks, an "A" licence pilot at present serving in the R.A.F. also commenced flying. On Friday, October 18, Mr. Thomson, of the Indian Civil Service, was launched solo and made a perfect three-point landing.

On Saturday, 19th, Mr. J. C. Green, of the Aero Club of Kenya, an ex-war pilot, completed his refresher course by qualifying for his "A" licence

HALTON AERO CLUB

Forthcoming Events.—November.—Lecture on Airship R.101. Note: Lecture will be held in Lecture Hall B at 6.30 p.m.

Several further applications for studentship have been made, but no notification has yet been received of their election.

15th Entry (2 Wing) members who obtained 60 per cent. or over in the final examination are urged to make application for studentship of this society.

H.A.C. "Sparrow."—A provisional C. of A. has been granted. This aircraft is to undergo flying tests at Martlesham, after which a few modifications are to be made by the club members as evening work. It will then be used for training purposes.

H.A.C. 3.—This is now about 90 per cent. finished, but progress is very slow owing to lack of available labour.

Club Reading Rooms.—A site for these has been provisionally agreed upon, and it is hoped will be opened for members' use as soon as furnished.

Flying Officer J. Clarke.—It was with the very deepest regret that the club learnt of the sad death of one of its members, Flying Officer J. Clarke, in a flying accident at Hull on Friday, October 11. The loss of his enthusiasm and ability will be keenly felt by the club, and the sympathy of all members is sincerely extended towards his relatives.

HANWORTH CLUB

LONDON now possesses the two largest flying clubs in the world.

The London Aeroplane Club at Stag Lane aerodrome, the first flying club to be formed, now possesses 520 members, while National Flying Services' new club at Hanworth has a total of 534 members, although it has been open for only six weeks.

No other city in any country can parallel these figures. Even so, they do not show the full extent of London's lead. Many Londoners are motoring out to Brooklands, Lympne, Hamble, Reading and even as far as Norwich to take flying lessons. All the British flying clubs and schools have increased their membership substantially during the past summer. The latest official estimate of membership places the grand total at over 5,000, of whom nearly 1,000 members have secured their pilot's licence.

Among the latest pupils at the Hanworth Club are the Marquis of Donegall, the Countess of Craven, Lord and Lady Apsley, Viscount Gough, the Rajah of Kalsia, the Hon. Mrs. Evan Morgan and the Hon. George Ward. Over 100 people are now taking instruction at Hanworth, including 10 women. On every fine day the club instructors find it almost impossible to cope with the rush.

Fifty members were enrolled in a few days at Hull, where a new flying club is being established by National Flying Services at the Municipal Aerodrome recently opened by Prince George.

The Prince of Wales' example in becoming an aeroplane owner has already resulted in a strong fillip to the manufacture of light aeroplanes. One new type—a novel three-seater sports coupé built at Croydon—is being sold even before production is complete, and the demonstrations booked by possible buyers will occupy the whole winter.

Tea dances will be held at the club on every Saturday and Sunday afternoon until further notice from 4.30 p.m. to 7 p.m. Charge (including tea), 2*s* 6*d*. each.

Dinner dances will be held on the first and third Fridays in each month until further notice, commencing on Friday, November 1. The following charges will be made: Dinner dance, 10*s*. 6*d*. each; dance only, 5*s*. each.

Extra dances will be arranged to take place on other Fridays preceding any important match at Twickenham.

The bridge and ping-pong rooms are now opened.

Arrangements are in hand for holding cinematograph shows at the club on the second Friday in each month before dinner. Special regard to matters of air interest will be given in these shows. Further particulars in regard to this matter, the date of opening the indoor Badminton court, &c., will be advertised from time to time under club notices in these columns and in *The Times*.

FROM THE FLYING SCHOOLS

Brooklands School of Flying, Brooklands Aerodrome

(OCT. 13-20).—Flying time: 26 hrs.

Again we took two of our private owners for a tour to educate them in cross-country and navigation. Thanks are due to the officials at Northampton, Birmingham, Bristol, Hamble and Lympne for the way they received them and the hospitality extended.

The Phillips and Powis School of Flying, Reading Aerodrome

(OCT. 10-17).—Flying time: 26 hrs. 30 mins. Instructor: Mr. W. Giddy.

We congratulate Messrs. Hayne and Henderson on passing their "height test" for "A" licence. We have supplied a Moth to Mr. H. C. C. H. Stisted. The following new pupils have this week joined the school: Messrs. Fryer, Armatage, Bishop and Irving.

OVERSEAS CLUBS

THE KARACHI AERO CLUB, LTD.

THE club, since flying began last February up to the end of last month, has accomplished 1,094 hrs. 45 mins. flying on its two Moth aeroplanes, and actually since VT-AAA became a "write-off" as a result of forced landing on July 12, most of the work has fallen on the other machine, VT-AAB, their respective flying hours being 255 hrs. 25 mins. and 839 hrs. 20 mins.

Last month only VT-AAB was in commission and 183 hrs. 25 mins. were flown, which is a record in this club, and has probably rarely been exceeded by any other club. Such a number of hours reflects credit not only on the club's instructor, Flight-Lieut. William Jones, R.A.F.O., but also on the club's ground engineer, Mr. D. M. Langford, whose untiring efforts enabled VT-AAB to be in commission during the whole of the month. During September 7 members obtained their pilot's "A" certificate *ab initio*, while one ex-R.A.F. officer re-qualified, thus bringing the total since February up to the end of September to 20 *ab initio* "A" pilots and 2 re-qualifications.

The membership of the club now totals 159, including 71 flying members, of whom 36 are Europeans and 35 are Indians.

Hitherto we have been using the Government hangar on the civil aerodrome at Drigh Road. The club's own hangar has been under construction for some weeks, and we hope to move into it at the end of the month.

◈ ◈ ◈ ◈

A "Cutty Sark" for Australia

SAUNDERS ROE, LTD., of East Cowes, seem to have struck a really good line in the metal monoplane flying boat *Cutty Sark*. It made its first public appearance at the Aero Exhibition at Olympia, where it attracted a very great deal of admiration. Since then many people on the Solent have seen this charming little aircraft flying overhead, alighting on the water, and taking off again. On a fine summer day a trip in it suggested the acme of pleasure. The owner pilot has been quick to recognise this, and a number of firm orders have already been placed. One of these comes from Melbourne, where Capt. G. C. Matthews, of 18, Murphy Street, South Yarra, has for a long time past been on the look out for a flying boat which will accommodate three or four persons. His ambition is to start an air service between Melbourne and Tasmania, and the *Cutty Sark*, with twin Cirrus-Hermes engines, just filled the bill. A service between Melbourne and Tasmania was one of those decided upon by the late Commonwealth Government in its comprehensive programme of civil aerial transport; but whether Capt. Matthews will get a subsidy from the new Government or will start the service without one is not known. Capt. Matthews, accompanied by Sergt. T. D. Kay, was the first pilot who attempted to fly from England to Australia in 1919 to win the Commonwealth Government prize of £10,000, which was ultimately won by Sir Ross and Sir Keith Smith. Matthews and Kay left England in a Sopwith Wallaby on October 21, 1919, and got as far as Java, where they crashed at Bali on April 17, 1920. Matthews succeeded in repairing the Wallaby and ultimately reached Australia. Since then he has remained active in the business of civil flying. All good luck to him in his new venture! He deserves it.

AIRISMS FROM THE FOUR WINDS

Graf Zeppelin

THE "Graf Zeeppelin," piloted by Dr. Eckner, which left Friedrichshafen on October 15 for a cruise over the Balkans and Silesia, returned there on the morning of October 17, having been in the air for 49 hrs. 20 mins. During this time the airship visited Belgrade, Vienna, Budapest, and Piersburg. Owing to unfavourable winds the "Graf Zeppelin" was unable to land at Breslau. When the airship was passing over Vienna in the early hours of the morning the Vienna Broadcasting station transmitted a special concert of Austrian folk songs for the benefit of its passengers.

DO.x. A Record Load

THE DO.x. flew on Monday, October 21, with 169 persons on board, which must constitute a record for heavier-than-air craft. She made a flight lasting 50 mins. and covered about 110 miles (177 kms.). She is said to have had on board sufficient fuel for a flight of 750 miles (1,207 kms.), in view of which it is claimed that with only 75 passengers, she would have been able to comfortably reach Fernando Noronha from the Cape Verde Islands, which is the proposed high road across the Atlantic. The take-off was very good, as she got off in about 50 secs., and the ship climbed well and flew at varying altitudes. The all-up weight for this trip was about 52 tons, which gives a pay load of 17 tons. She is now being fitted to permanently accommodate 72 passengers, and in the spring propaganda flights will be made to north and south America. It is reported that two sister ships have been ordered for Italy for the Mediterranean traffic and that one is already 90 per cent. complete.

An Italian Endurance Record Effort.

THE Italian airmen, Commander Maddalena and Lieut. Ceconi, started from the military aerodrome at Montecelio, on October 17, in an attempt to create a new world endurance record for sustained flight without refuelling, taking turns at piloting the aeroplane specially constructed for the flight.

Another Atlantic Attempt

MR. U. F. DITEMAN left Harbour Grace, Newfoundland, on Tuesday last, October 22, in an attempt to fly to London. His machine was a small Barling monoplane, with a 60 h.p. engine. He had on board 165 U.S. gallons of fuel, which should have given him a duration of, roughly, 25 hours. Up to going to press, there was, however, no news of him here.

New Glider Record

A NEW gliding record was set up by Lieut. Dinor, at Rossitten, near Königsburg, on Saturday, October 19. He started at 3.19 p.m. and landed at 6.3 a.m. on Sunday morning, making a flight of 14 hrs. 44 mins.

Le Bourget-Africa Flight

THE French airmen Bourgeois, Goulette and Marchesseau left Le Bourget, in a Farman F.140 monoplane, on October 17 for a flight by easy stages to Madagascar and Reunion, *via* Oran, Colomb-Bechar, Gao, Elizabethville, Broken Hill, Mozambique and Antananarivo. They are carrying 300 lbs. of mails.

New York-Buenos Aires Air Service.

THE first of a batch of 12 flying boats, each carrying 20 passengers, to be used on the New York-Rio-Buenos Aires passenger and mail air service, left Washington for Argentina on October 17.

Shanghai-Hankow Air Service

A REGULAR aerial service between Shanghai-Hankow, operated by an American company with amphibian machines, was scheduled to start on October 17. A successful return flight between the two points was carried out a few days before, the 1,200 miles being covered in 12 hours.

Air Trips from Calgary, Canada

RUTLEDGE AIR SERVICE, LTD., has established scheduled aeroplane trips to Turner Valley, and the service has been well patronised. The distance between Calgary and the valley is covered in 25 mins. It takes an hour and a half by automobile.

A GOODYEAR "BLIMP" IN CANADA : The Goodyear "Mayflower" dirigible cruising round the C.P.R. Hotel, "The Royal York," at Toronto. This "blimp," in company with its sister ship, the "Puritan," flew from Akron, Ohio, to Hamilton on the inauguration of the new Hamilton Air port on June 6 last.

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Messrs. Lodge Plugs Ltd.,
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Dear Sirs:

We wish to congratulate you on the success of your plugs fitted to the Rolls-Royce engines in Supermarine S.6 in the Schneider Trophy Race, and also to the machine which holds the world's record for speed.

Lodge plugs were used in both Schneider Trophy machines with our engines.

Our decision to use Lodge plugs was only arrived at after exhaustive tests at Derby; and during the actual Race and on all the practice flights we had no troubles.

We thank you for the assistance you gave us.

Yours faithfully,

For ROLLS-ROYCE LIMITED

Managing Director.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

October 25, 1929

CONTENTS

EDITORIAL VIEWS

It might have been thought that the phenomenon known as "spinning" was by now familiar to almost everyone who takes an interest in the technical side of aircraft problems. We are quite sure, however, from letters which continue to reach us, and from "inventions" submitted to us, that this is very far from being the case. Anyone who visits aerodromes must have noticed how very frequently one still comes across the opinion that such and such a machine is very unstable, "it spins so easily." Spinning, in other words, is looked upon as a form of instability, which superficially it is in relation to the steady, straightforward flying of an aircraft on a straight-line course. That spinning is actually one of the steady and stable motions of an aircraft is probably realised by a very small percentage of people.

In this issue Lieut.-Col. Blyth, of the Technical Staff of the Gloster Aircraft Co., begins an article on the subject which we believe will go a long way towards elucidating the nature of spinning. It is obviously not possible to explain such a relatively complicated phenomenon entirely in "untechnical" language. (If it were, there would be no object in publishing the article in THE AIRCRAFT ENGINEER.) But there is a deal of difference between the usual treatment of the subject by the mathematician and the manner in which Col. Blyth approaches it. We feel certain that, with a little effort on their part, students of aerodynamics, draughtsmen in aircraft drawing offices, and others with a fairly elementary knowledge of algebra, will be able to follow Col. Blyth's explanations. The article has had to be divided into two sections, of which the first, published this month, deals with the part played by the aerofoils (monoplane or biplane), while the second part, which we hope to publish next month, will deal with the effect on the spinning properties of the machine as a whole.

Navigation is not among the subjects usually dealt with by the aircraft engineer, but as the article on the Addison-Luard Course calculator explains the geometrical working principles involved we make no excuse for its inclusion. The instrument is likely to enjoy great popularity, and the explanation of its basic principles is interesting and instructive.

SPINNING.

By LIEUT.-COL. J. D. BLYTH, O.B.E., M.I.Ae.E.

Part I.—The Aerofoil.

No apology is made for the deliberate avoidance of any but the most simple mathematics in the following article, since its object is to show that spinning is due to perfectly natural causes, and is not, as many people seem to think a bogey created by black magic wrought—presumably—by the invisible djinnee of the upper air.

The basic cause of spinning is autorotation of the wings, following a stall. Once autorotation has commenced further developments will depend upon the characteristics of the whole machine, some of which will tend to intensify the spin while others will operate against it. Such characteristics will be considered later; the first step is to form a clear idea of the nature and cause of autorotation.

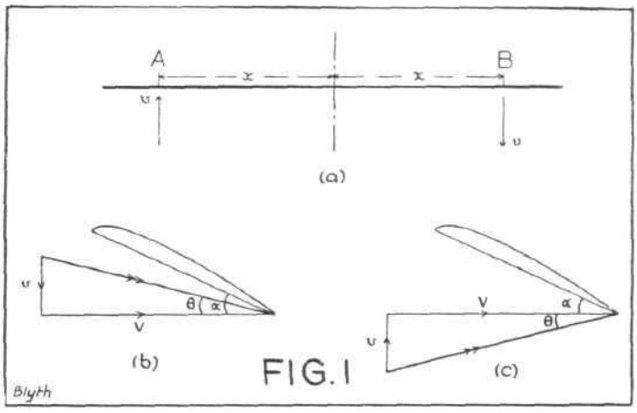


FIG. 1

Consider an aerofoil as shown in Fig. 1 (*a*), flying at speed V, which is subjected to a lateral displacement such that the sections A and B, equidistant from the plane of symmetry, are given initial velocities v upwards and downwards respectively. The resultant air velocities at the sections are shown in Figs. 1 (*b*) and 1 (*c*): from which it may be seen that the incidence of the ascending section A is reduced, while that of the descending section is increased; the amount of such increase or decrease being $\tan^{-1}\frac{v}{V}$

If Ω is the angular velocity of the displacement about the centre of the aerofoil we get $v = x\,\Omega$

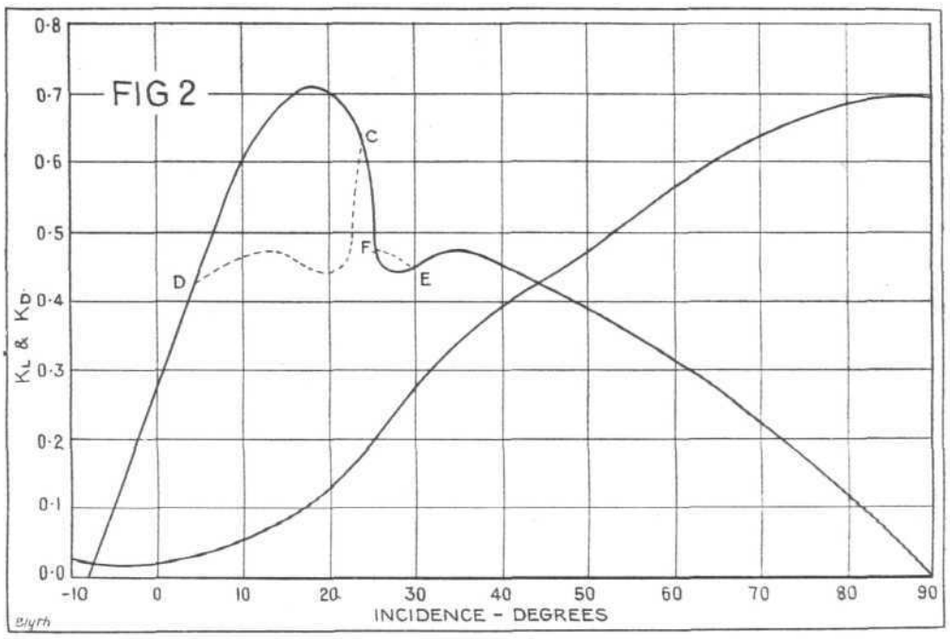
and $\tan^{-1}\frac{v}{V} = \tan^{-1}\frac{x\,\Omega}{V}$

If α is the initial incidence of the aerofoil and $\theta = \tan^{-1}\frac{v}{V}$ the new incidences of A and B are $\alpha-\theta$ and $\alpha+\theta$ respectively. The effect of this is that the resultant forces at A and B are different, and form a couple whose coefficient is $(K_{\alpha-\theta} \sim K_{\alpha+\theta})x$, where K is the coefficient of resultant force at the appropriate angle, and is equal to $(K_L^2 + K_D^2)^{\frac{1}{2}}$. This couple may either tend to return the aerofoil to its original attitude, or to increase the lateral displacement: the actual effect will depend upon the values of α and θ.

We will consider first the effect of the variation of the lift coefficient K_L only, thus taking into account rolling moment but for the present disregarding the yawing moment caused by the variation of the drag coefficient K_D.

Fig. 2 gives the curves of K_L and K_D against incidence for a typical aerofoil section. If $\alpha = 8°$ and $\theta = 2°$ the resulting incidences are 6° at A and 10° at B; and it is clear from Fig. 2 that the upward force at A is less than that at B, and the couple so formed resists the lateral displacement and tends to restore the aerofoil to its original attitude. At this value of α, therefore, the aerofoil is in a condition of rotary stability, provided that A and B are so selected that they represent the mean sections of the semi-spans: the total couple on the whole aerofoil being the sum of the couples on all pairs of sections equidistant from the axis of symmetry over the whole span.

If $\alpha = 24°$ and $\theta = 2°$ the incidences become 22° at A and 26° at B, the corresponding values of K_L being 0·675 and 0·45 respectively. The upward force at A is now greater than the upward force at B and the couple formed assists the displacement and imparts an angular acceleration to the aerofoil, causing Ω to increase until θ has such a value that the lift coefficient at incidence $\alpha-\theta$ is equal to that at incidence $\alpha+\theta$ and consequently the upward forces at A and B are equal and there is no further angular acceleration. In other words, the initial displacement has caused a couple to act on the aerofoil which forces it to rotate with increasing angular velocity until it reaches a condition of stable rotation when there is no further rolling moment. The couple caused by the initial lateral displacement has given rise to the phenomenon known as autorotation.



In the example we have taken, this occurs when the incidence at A is $4\frac{1}{2}°$, whence $\theta = 19\frac{1}{2}°$. This is shown by drawing the curve C D in Fig. 2, C D being the reflection of the K_L curve beyond the value of α, in this case 24°. When θ is $19\frac{1}{2}°$, *i.e.*, at D, the incidences at A and B are $4\frac{1}{2}°$ and $43\frac{1}{2}°$ respectively, and the value of K_L in each case is 0·43. This shows that there is no couple producing a rolling moment, and consequently there is no acceleration. If A and B represent the average of all sections along the span the aerofoil will rotate at a constant angular velocity Ω such that

$$\tan^{-1}\frac{\Omega x}{V} = 19\tfrac{1}{2}°$$

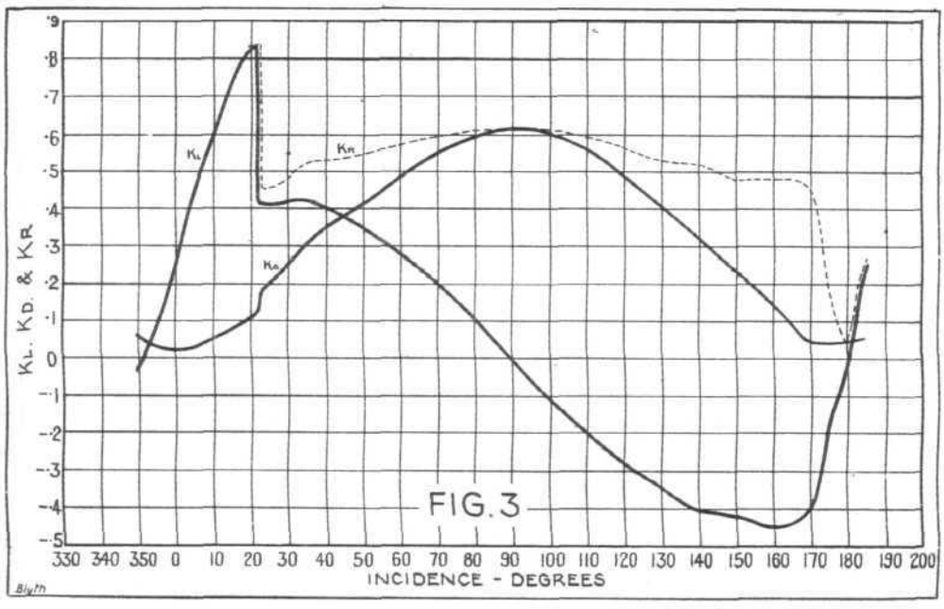
If $\alpha = 30°$, the curve EF shows that unless the initial value of Ω is sufficient to make θ greater than $4\frac{1}{2}°$ autorotation will not occur.

Since $\tan^{-1}\frac{\Omega v}{V} = \theta$ it will be seen that if θ and V are constant the product Ωx is constant; while if θ and x are constant the value of $\frac{\Omega}{V}$ is also constant. This shows that if the variation in K_L were the only cause of autorotation the rate of spin would vary inversely as the span and directly as the forward speed.

Consideration of the curve of K_D, the drag coefficient, shows that the drag at incidence $\alpha + \theta$ is greater than that at $\alpha - \theta$; the result being that the descending wing will be retarded, the ensuing rotation being a compound of rolling and yawing. Since the absolute value of the lift varies as the square of the speed, the difference in lift between the two wings will be augmented by this effect, and the rate of the rolling component of the spin will tend to increase.

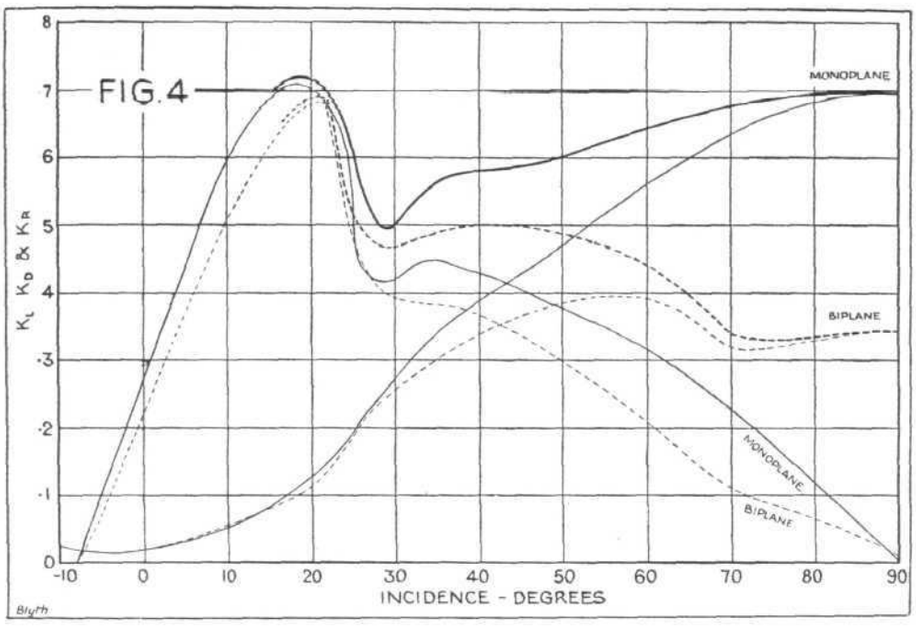
The movement of the centre of pressure, the position of which varies with the angle of attack, will cause the resultant forces on the two wings to act at different distances from the leading edge, and on this account a small pitching or stalling moment will be set up.

Examination of the curves shows that as the value of θ increases from the initial displacement to its final value at constant Ω, the numerical value of the couple producing autorotation will vary considerably. This will give rise to



varying acceleration, and the movement of a machine prior to attaining a condition of stable autorotation may be far from steady.

It will be seen also that as the spin commences, the moment



due to the difference of lift on the wings is generally considerably greater than that due to the difference of drag; while as the stable rate of rotation is approached the drag effect may become greatest. If the effects are traced through various intermediate angular velocities, it will be seen that the aerofoil passes from rolling at a comparatively low rotational speed to a combination of rolling and yawing at higher speeds until the final angular velocity is reached, when the yawing movement may predominate. The extreme case at an angle of incidence of 90° will be shown later to be a movement composed entirely of yawing at a high angular velocity.

Fig 3 shows curves of K_L, K_D, and K_R over a range of incidence from 350° (*i.e.*, − 10°) to 190° for an aerofoil of camber ratio 0·186. These curves are plotted from the figures given in R. & M. 958. Similar curves up to an incidence of 90° are given in Fig. 4: the section in this case being Göttingen 387. The figures from which these curves have been plotted are taken from N.A.C.A. Report No. 273. Corrections for tunnel interference have been applied in neither case; this, however, will not affect the shapes of the curves materially.

Glauert has shown that the criterion for rotary instability is

$$\frac{d\,K_L}{d\,\alpha} + K_D < 0$$

α in this case being measured in radians.

The approximation

$$\frac{d\,K_R}{d\alpha} < 0, \text{ where } K_R = (K_L^2 + K_D^2)^{\frac{1}{2}}$$

is more simple, and gives very nearly the same results. Here α may be expressed in degrees or radians.

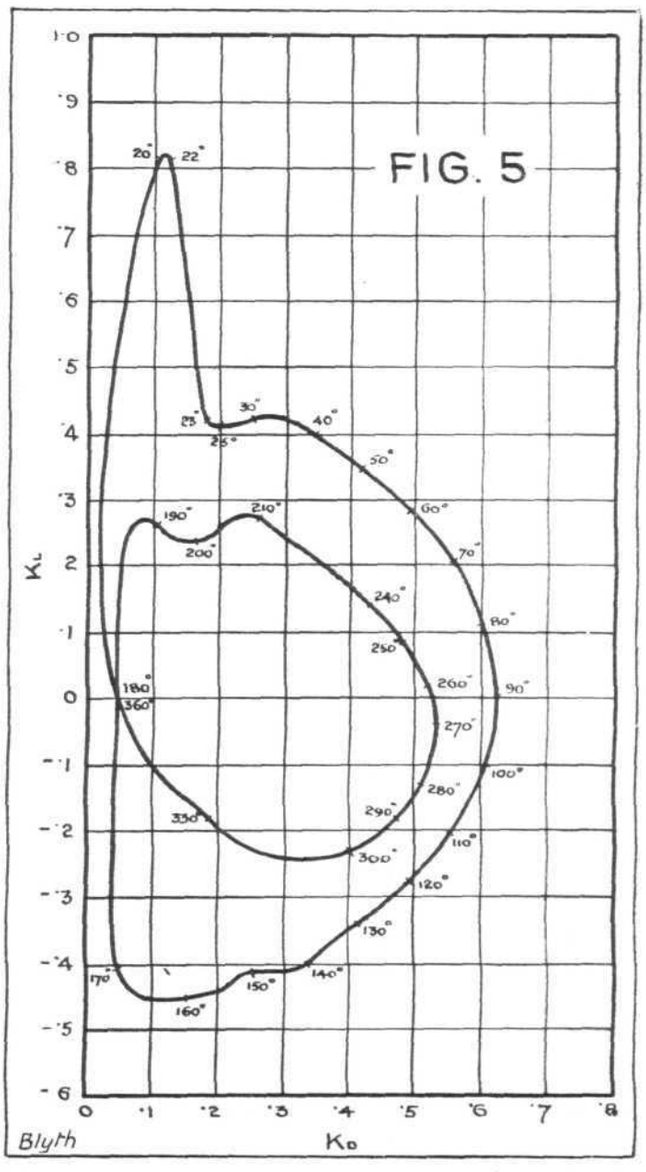
If K_L is plotted against K_D to obtain the polar diagram, the vector at any angle of incidence gives K_R, the coefficient of the resultant force, both in magnitude and direction: the angle between the vector and axis of K_D giving the direction of the force relative to the line of flight.

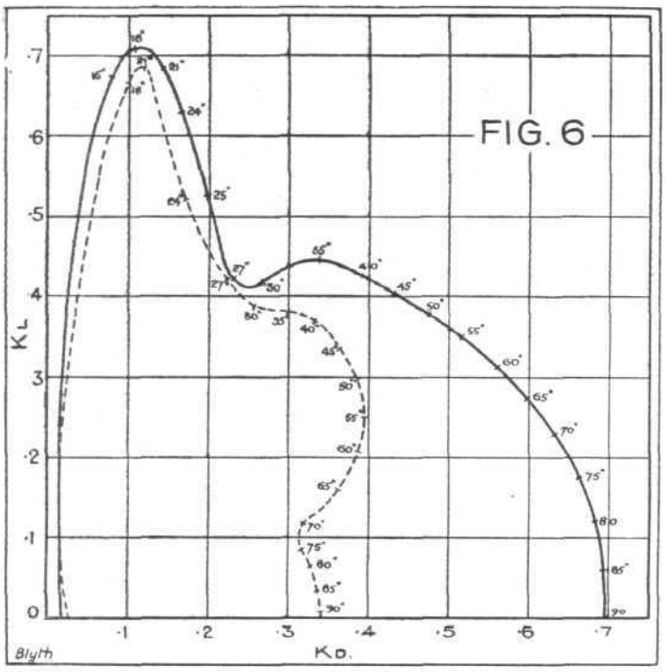
In Fig. 5, the polar diagram for the aerofoil whose characteristics are given in Fig. 3 is plotted through the whole range of incidences from 0° to 360°. Flight at every incidence throughout this range is obviously impossible: the curve is given as a matter of interest, since it has seldom, if ever, been published before.

Fig. 6 shows the polar diagrams from 0° to 90° for Göttingen 387, both monoplane and biplane.

Since the descending wing has the greater incidence, it follows that if, commencing at any value of α, the magnitude of the vector decreases as α increases, and increases as α decreases, the value of $\frac{d\,K_R}{d\,\alpha}$ is negative, and the aerofoil is in an attitude of rotary instability.

The condition of rotary stability means that a small lateral displacement will not be followed by autorotation, but it does not necessarily mean that autorotation is impossible, since, for a considerable range of angles above the stall, at which the aerofoil is in a condition of rotary stability, autorotation can be forced by applying a lateral displacement whose angular velocity Ω is of such magnitude that $\tan \frac{-1\,\Omega\,x}{V}$ is great enough to cause the vector at $\left(\alpha - \tan \frac{-1\,\Omega x}{V}\right)$ to be greater than the vector at $\left(\alpha + \tan \frac{-1\,\Omega x}{V}\right)$.





At $\alpha = 90°$, any small displacement causes the lift on the ascending wing to be positive, while that on the descending wing becomes negative, the drag coefficients being practically equal. The vectors (K_R) are equal in magnitude, but contain components of opposite sign, and autorotation will ensue. The condition arrived at is not easy to visualise, as the lift acts along the chord. Reference to Fig. 7 will make matters clear.

Fig. 7 (i) shows the components v and V, and the resultant velocities in magnitude and direction on the sections A and B of Fig. 1 (*a*). Fig. 7 (ii) shows the lift and drag coefficients, ab and de being K_L, and ac and df being K_D. In Fig. 7 (iii) these forces are shown split up into their components at right angles to and parallel to the chord: a^1b^1 and d^1e^1 being components of K_L, and a^1g^1 and d^1h^1 components of K_D parallel to the chord: while a^1c^1 and d^1f^1 are the sums of the components of K_L and K_D at right angles to the chord.

Since $a^1c^1 = d^1f^1$, it will be seen that the resultant couple set up by $(a^1b^1 - a^1g^1)$ and $(d^1e^1 - d^1h^1)$ will cause the aerofoil to rotate about an axis perpendicular to the chord, the result being the extreme case of flat spin. Reference to Fig. 3 shows that the value of Ω will be very high.

A machine in such a flat spin would be descending vertically, the rate of descent being low as K_D is large. In the case of a full-size aeroplane, it is improbable that such a spin could be caused by any action of the pilot; but the condition is not an impossible one, as is sometimes stated, the writer having produced it on several occasions with models, both monoplane and biplane.

Fig. 6 shows that for this particular aerofoil, the region of rotary instability extends from 19° to 28° in the case of the monoplane, while in the case of the biplane, there are two regions, the first extending from 21° to 30°, and the second from 42° to 72°.

In the case of a biplane spinning at an incidence below 30°, if the incidence is increased to some value in the stable region between 30° and 42°, the autorotation will die out unless, as is quite possible, the value of Ω is sufficiently great to cause forced autorotation to occur throughout the stable region. In the case of a spinning monoplane, autorotation can be forced at incidences greater than 28°, but the value of Ω will have to be very great to reach high angles of incidence without the spin dying out.

In other words, a monoplane is free from any tendency to pass from a steep spin (or "tail" spin) into a flat spin, whilst a biplane may exhibit marked flat-spinning tendencies.

Experiments carried out on biplane wing combinations using R.A.F. 15 section (R. & M. 733) show that positive stagger decreases the rate of spin, whilst negative stagger increases it. In a biplane the lower wing shields the upper wing at large angles of incidence, an effect which increases as the incidence increases until, as can be seen in Fig. 4, from $\alpha = 70°$ to $\alpha = 90°$ the values of K_L and K_D for the biplane are almost exactly one-half of those for the monoplane. This is in the case of an unstaggered biplane; it is obvious that positive stagger would delay the shielding effect, while negative stagger would cause it to occur at smaller angles of incidence.

The effect of the progressive increase in shielding is to make $\frac{dK_L}{d\alpha}$ more pronouncedly negative, and to reduce the value of K_D. Consequently, Glauert's criterion for rotary instability, $\frac{dK_L}{d\alpha} + K_D < 0$ is more easily arrived at in the case of the biplane; and if the reflections of the curves in Fig. 4 are drawn in the same way as in Fig. 2 it will be seen that a greater value of θ, and therefore of Ω, will be reached in the stable spin in the case of the biplane than in the case of the monoplane.

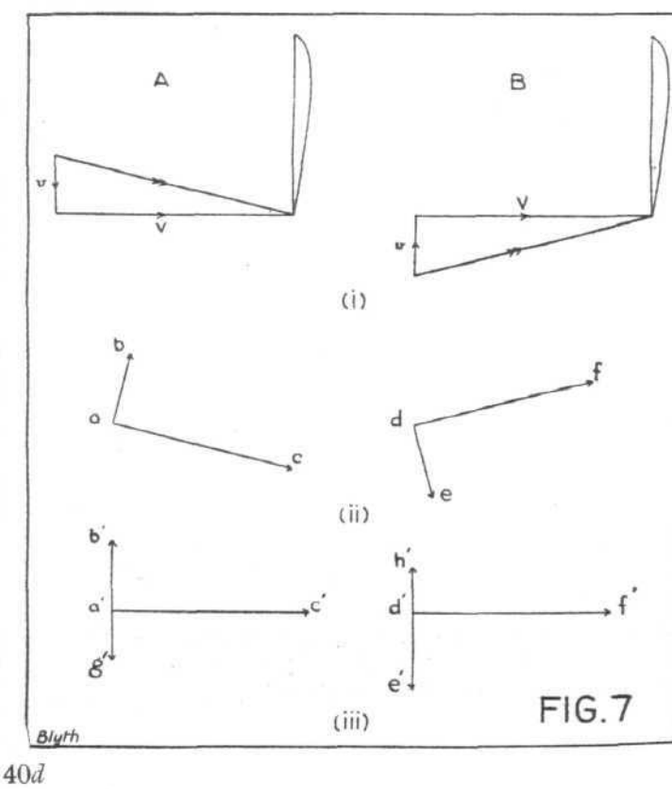
It has been shown that the rate of spin varies inversely as the span; and since the span of a biplane is generally less than the span of a monoplane of equal area, the rate of spin of the biplane may be expected to be further increased on this account. As will be shown later, this increased rate of spin intensifies the flat-spinning tendencies of the biplane, since it increases the inertia forces tending to lift the nose of the machine.

Obviously, therefore, it is desirable to reduce shielding as far as possible. The use of a lower wing either smaller or larger than the top wing would reduce the proportion of the shielded area to that of the whole area; the worst arrangement appears to be an equal wing biplane with negative stagger.

Tests on the separate wings of a biplane without decalage (R. & M. 733) show that the upper wing stalls before the lower one. From this it may be deduced that giving the upper wing a greater incidence than the lower wing, *i.e.*, positive decalage, might prove beneficial, while negative decalage is to be avoided.

In the cases of both biplane and monoplane the rate of stable spin is reduced by increasing the span, while the rolling and yawing moments may be reduced by using tapered or twisted wings, the twist taking the form of reduction of incidence towards the wing tips, or "wash-out."

If the characteristics of a number of aerofoil sections are examined it will be seen that, generally speaking, the lift curve for thin wing sections turns over comparatively gradually in the region of the stalling angle, while for thick



sections it breaks and drops suddenly. This indicates that thin sections will be less prone to spin than thick sections at angles slightly above the stall, but will have a greater rotational velocity once the stable spin is established.

Without tunnel tests of aerofoil characteristics at angles up to 90° it is impossible to compare the relative merits of different aerofoils in terms of their rotary stability at angles above the stall. The characteristics will be such that the angle represented by the intercept CD in Fig. 2 will vary, showing that the rate of rotation in the stable spin will vary with different sections; but it does not seem to be an assured fact that an aerofoil having a fairly high speed of stable rotation will be any more unstable at a large angle of incidence than an aerofoil having a lower rate of stable rotation at the same angle.

The same uncertainty regarding conditions above the stall prevails in the case of slotted wings. The effect of slots is to prolong the K_L curve upwards and delay the stall; it is improbable that their use will make spinning impossible as the value of K_L must drop eventually. Certainly the danger of an involuntary spin is greatly reduced, as with slots the stalling angle can be made so great that it is not likely to be reached inadvertently.

(To be concluded.)

THE ADDISON-LUARD CALCULATOR.

(Concluded from page 71.)

The double drift method is of especial importance when an aircraft is flying over the sea or over uncharted country devoid of known landmarks. In these circumstances it is impossible to gauge ground speed by timing the progress of the machine over a known distance, and although it is sometimes possible to estimate ground speed from a knowledge of the height of the aircraft, in conjunction with vertical sighting devices, serious errors are likely to occur. In the double drift method, however, observations are required only of course, air speed and drift angle, on two courses. Fig. 5 shows the graphical construction necessary for working out such a set of observations, while Fig. 6 shows the type of Addison-Luard Calculator which does the work mechanically. For reference this is known as the Type "C" Calculator. The observations are assumed to be:—Original course = 80°; Original air speed = 100 m.p.h.; original drift angle = 10° to starboard. After altering course the readings are then found to be: Course = 35°; air speed = 100 m.p.h.; drift angle = 15° to starboard.

The type "C" instrument differs from the simpler or type "B" model shown in Figs. 3 and 4, only in the addition of another air course arm, with cursor, and another drift scale mounted on the cursor; this drift scale is operated by a telescopic link coupled to the wind speed cursor. These additional parts are referred to as the "Auxiliary Air Course" arm, the "Auxiliary Air Speed" cursor, and the "Auxiliary Drift" scale.

The settings required to work the problem quoted above are: Set air course arm to 80°: air speed cursor to 100;

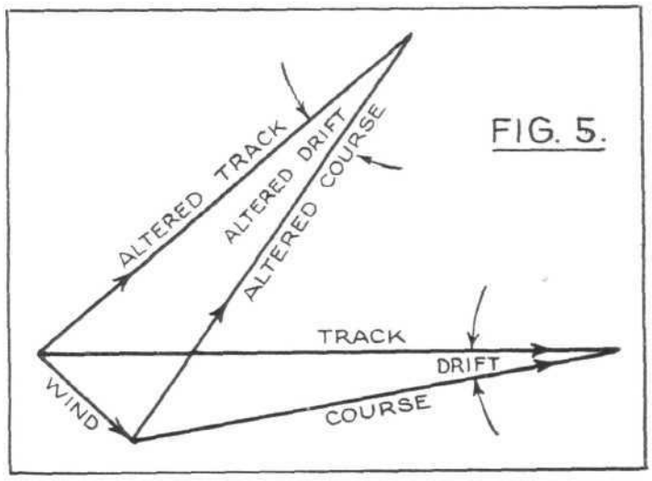
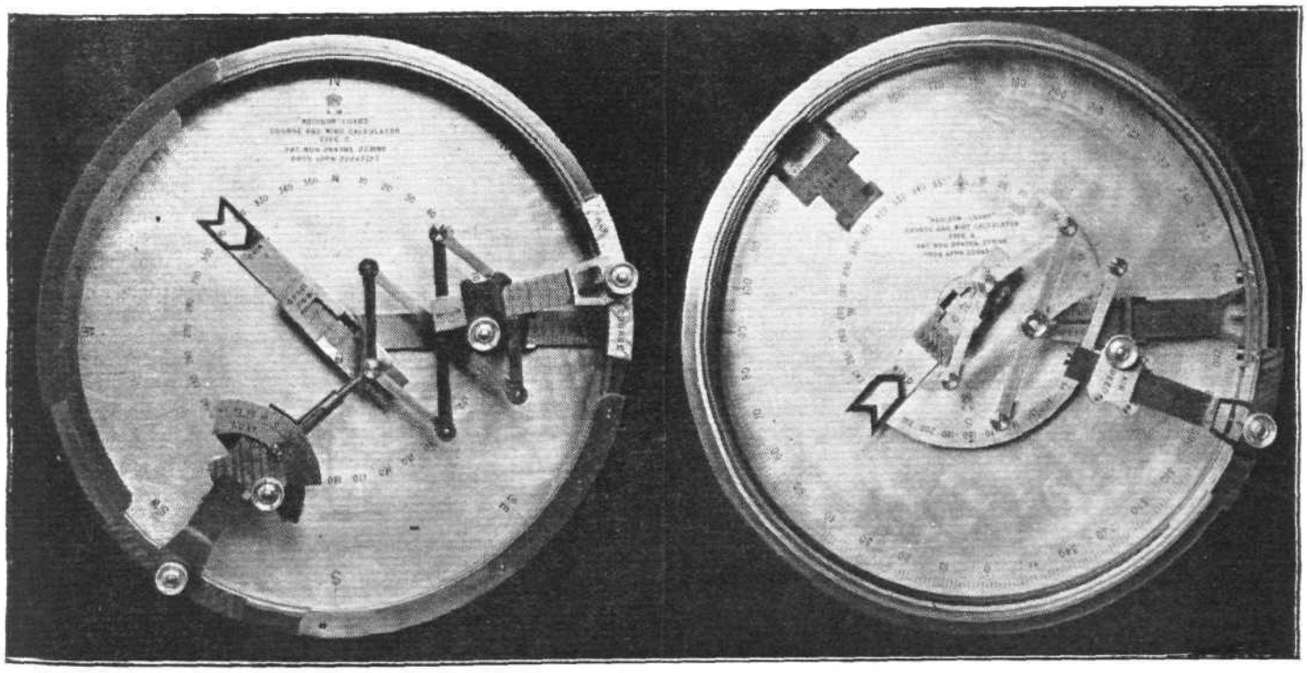


FIG. 5.

auxiliary air course arm to 35°; auxiliary air speed cursor to 100. Now move the wind arm and wind speed cursor until the drift shown on the main drift scale is 10°, while the drift shown on the auxiliary drift scale is 15°. Then the required information can at once be read off without further manipulation, viz.: wind direction, 313°; wind speed, 26 m.p.h.; track on original course, 30°; ground speed on original course, 119 m.p.h. It should be observed that the main drift scale is mounted on the track arm, and can be seen in Fig. 4; the position of the auxiliary air course arm is read with respect to reciprocal degree graduations engraved on the outer rim of the base.

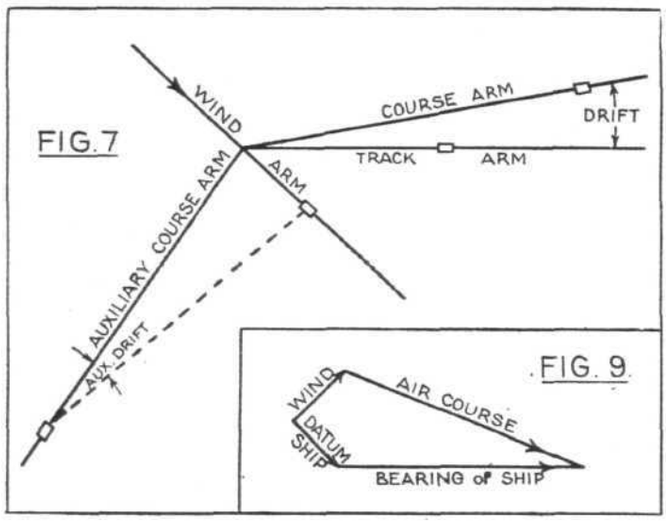
To assist in correlating the triangles, Fig. 5, with the instrument, Fig. 6, a diagram, Fig. 7, has been added, though it will be evident that its purpose is merely to explain the



On the left, Fig. 6, the type "C," and on the right, Fig. 8, the type "D" Addison-Luard Course Calculator.

principle of the calculator, and that no diagrams of any kind are required in actually using it.

We now come to the third and perhaps most interesting form of the Addison-Luard invention, known as the type



" D " calculator; this is an instrument specifically designed for aircraft operating in conjunction with surface ships. The navigational problems in these conditions are relatively intricate, involving as they do the movements of the aircraft, of the wind, and of the surface vessel; and the problems must be solved with great accuracy if the aircraft is to find its way safely back to its floating base. Here are some of the problems that actually arise: To find the wind direction and velocity from observations made from the aircraft on the surface ship; to find course to steer to land on a surface ship; to find course to steer to keep the aircraft on a given bearing with respect to a surface ship. The surface ship in question may be an aircraft carrier, or an ocean liner delivering or receiving mails by air; it will be referred to in the subsequent explanation as the " datum ship."

Graphical solutions of such problems show that in most cases they take the form of finding the fourth side of a quadrilateral. The type " B " Addison-Luard calculator was designed to find the third side of a triangle, and what the inventors were asked to do was to add a fourth arm and a fourth cursor in such a way that quadrilateral problems could be solved. In the end the Type " D " calculator was produced (Fig. 8). The fourth arm is called the " Datum ship " arm, and it revolves about the centre of the base; the fourth cursor is the " datum ship speed " cursor, which slides on the datum ship arm and carries the pivot about which the wind arm revolves and also carries the circular degree scale from which wind directions are read. It therefore follows that the act of setting the datum ship elements displaces the axis of the wind elements by an amount corresponding to the datum ship velocity; this eccentricity is clearly visible in Fig. 8. As a consequence, the track arm can no longer be pivoted mechanically at the centre of the base, though the same effect is secured by mounting the outer end of this arm on a circumferential saddle. For the same reason, the ground speed cursor is not coupled mechanically to the pantagraph, but registration between the two is effected by a simple sighting device. Finally, a sliding mechanism beneath the base ensures that the orientation of the wind degree scale is not affected by the displacement of its centre; that is, the 0°–180° diameter of this scale always remains parallel with the corresponding diameter of the main degree scale. It will be observed that the degree scale engraved on the flat bottom of the base seen in Fig. 8, is a *reciprocal* scale.

As an example of the use of the type " D " calculator, let it be required to find the course that an aeroplane must steer to intercept and land on a ship bearing due east, having given that:—Course of datum ship is S.E.; speed of ship is 18 knots; wind direction is S.W.; wind speed is 20 knots; air speed of aeroplane is 75 knots. The solution is:—Set datum ship arm to 135°; datum ship speed cursor to 18; wind arm to 225°; wind speed cursor to 20; track arm to 90°; air speed cursor to 75; air course arm so that pantagraph registers with ground speed cursor. Then the required air course can at once be read off, viz., 111°. The reading of the ground speed cursor, 72 knots, gives the *relative* ground speed, or rate of closing between the aeroplane and the datum ship, which can be used to calculate the time at which the two craft will meet. To find the *true* track and ground speed, it is merely necessary to bring the datum ship speed cursor to zero, *i.e.*, to centralise the wind degree scale, and to re-register the track arm and ground speed cursor, whereupon the true track is found to be 99°, and the true ground speed, 85 knots. Fig. 8 shows the settings for the main problem, and Fig. 9, the equivalent geometrical solution.

A further stage of development is reached by fitting the type " D " calculator with an auxiliary air arm, cursor, and drift scale, similar to those embodied, in the type " C " instrument, resulting in the instrument illustrated in Fig. 10. The calculator is then adapted for solving double drift problems in which drift observations are made on a *moving object*, *i.e.*, on the datum ship; or expressed geometrically, the instrument solves two simultaneous quadrilaterals in the same manner that the type " C " instrument solves two simultaneous triangles. It is, of course, hardly necessary to point out that by bringing the datum ship cursor to zero, thus bringing the wind degree scale concentric with the base, the type " D " calculator becomes precisely similar in its functions to the type " B " and type " C " patterns.

In discussing the practical utility of instruments such as those described above, there is likely to be a direct divergence of view between two temperamentally opposed types of navigator; on the one hand, the officer who instinctively puts his faith in any kind of instrument, and on the other, the officer who distrusts all instruments. But the more intricate navigation becomes—the more the navigator is obliged to depend on the results of his observations for the proper guidance of his craft—the more sympathetically he will be likely to regard any appliance that reduces the mere routine labour of working out these observations. In arithmetical computations we soon reach a stage of complexity at which a slide-rule or an adding machine is preferable to long multiplication or addition; similarly in navigational problems there comes a point where the navigator can easily be persuaded to save much time and gain increased certainty by substituting a mechanical appliance for the toil of graphically plotting involved series of vector diagrams. Having read off from his mechanical calculator the true track and ground

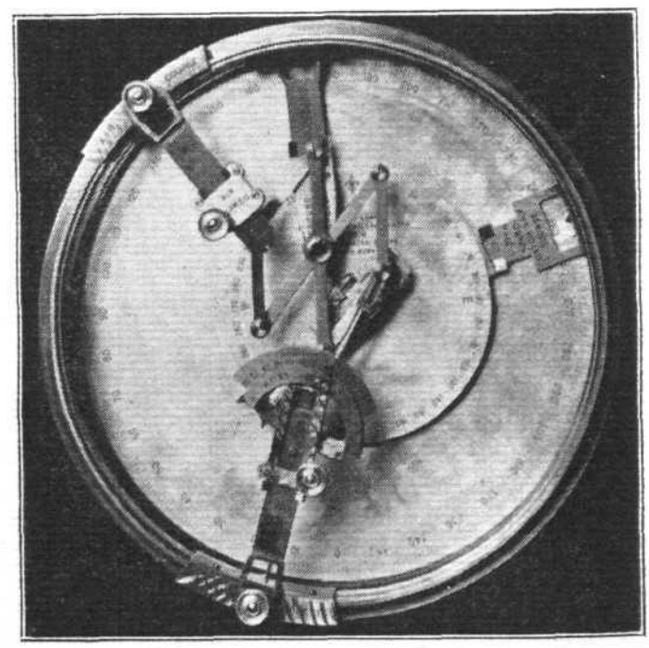


Fig. 10, the special Calculator used for double drift observations on moving objects.

speed of his machine, the air navigator has only actually to plot on the chart his true position, just as is done by the navigator of a surface vessel.

Resulting from their basic principle of design the Addison-Luard instruments are claimed to have the following specific advantages :—

(1) The apparatus is automatic, that is, after the elements representing known quantities have been set to their proper values, the values of the remaining quantities can at once be read off.

(2) A separate and *distinctively lettered* component is provided for each of the quantities—track, datum ship speed, wind direction, etc.—concerned, and the speed and direction elements representing each vector are always directly associated. Thus, the air speed cursor is mounted directly upon the air course arm, and so on.

(3) *All* readings are made from index marks working over graduated scales—no use is made of ruled discs, squares that have to be counted, pencil lines that have to be drawn, etc.

(4) After the arms, etc., of the calculator have been set and clamped they show in the most graphic way, at a glance, the relationship between course, track, wind, etc. The instrument, that is to say, is an indicator as well as a calculator.

(5) As the instrument is designed solely for making calculations and not for making observations, it can be kept entirely separate from the observing instruments on which the navigation of the aircraft depends—compass, drift indicator, etc.—and therefore the navigator can use it in comfort in his cockpit or cabin instead of keeping his head over the side, probably in the propellor slip-stream. Moreover, this division of functions permits complete freedom of choice in the method of estimating drift. Since the drift measuring appliances are not combined with the calculating part of the apparatus, drift may be assessed by the use of a bearing plate, or of telescopic devices, or by a bearing compass, or by marks on the planes of the machine, or in any other way.

As regards the size of the Addison-Luard instruments, a diameter of 9 in. has been found convenient for the type "C" pattern, the weight of the complete calculator being 17 oz. In addition to the instruments described in this article, other types are being developed, adapted for aerial and marine navigation and also for surveying and similar work. The sole licensees for the British and foreign patents held by the inventors are Henry Hughes & Son, Ltd., of 59, Fenchurch St., E.C.3, while the sole distributors are S. Smith & Sons, Ltd., Cricklewood, London, N.W.2, from whom all further particulars can be obtained.

AN ANALYTICAL REVIEW OF THE AERO ENGINE EXHIBITS AT OLYMPIA.

By N. E. KEARLEY, A.M.I.E.E., A.M.I.A.E.

(*Continued from page* 67)

Air-cooled Engines (*continued*).—The last instalment closed with an analysis of the various types of cylinder construction to be found among the air-cooled engines at the Show. The smallest proportion was naturally of the type which could not be easily classified and was therefore labelled "other constructions," and actually referred only to the unusual type of cylinder employed in the Fuscaldo 90 h.p. seven-cylinder radial. This engine incorporates many unorthodox but interesting features, the cylinder design being not the least among these. The cylinder heads are made integral with the steel barrels, the combustion chamber bing of hemi-spherical form, whilst the valve seats, guides, springs, rocker gear and induction or exhaust passages are all carried by or form part of two detachable units, one to each valve, these units being of cast aluminium and deeply finned. The inclined valves (they are set at 90° to each other) are located on the fore-and-aft axis of the cylinder, the inlet being rearmost, whilst the two opposed and inclined sparking plugs are located at the sides of the head where they obtain the full benefit of a totally unobstructed air stream. This detachable valve unit arrangement would appear to be open to criticism on the question of heat transference from the valve seats, but this would depend chiefly on the method of securing the valve carrying units to the cylinders and unfortunately the manner of doing this could not be ascertained. It was noted, however, that the walls of the units were of generous proportions. In addition to the unusual arrangement of the valves of this engine their actuation by push rods located at one side of the cylinder is something of a novelty, which incidentally gives the cylinders an extremely neat appearance.

Before leaving the subject of cylinder design and construction, some reference must be made to valve arrangements in general, as the head design cannot properly be considered apart from the valve arrangement. One very noticeable feature is that in a number of cases the space occupied by the valves and their operating gear on the head accounts for almost one-third of the total length of the cylinder, which in the case of a radial engine amounts to approximately one-fifth of the diameter. If therefore the overhead valve gear could be eliminated the projected area of a radial engine could be reduced by from 30 to 40 per cent. In this connection it is of interest to recall that it was definitely established a few years ago by Ricardo that there is nothing to choose between the efficiency of a well-designed side-valve engine and one of identical dimensions, compression ratio, cam contour, etc., but having overhead valves, push rod operated the combustion chamber of each being of the form most suited to the type. It therefore seems a little difficult to understand why, in the light of existing knowledge, the main disadvantage of the radial engine in its present form, *i.e.*, its large frontal area, should not be reduced almost to vanishing point. With reference to the in-line engines, it is well-known that an engine having overhead valves operated directly by camshaft has a definite advantage over a side valve engine of similar physical characteristics, and if the Airsix experiment is successful there is no reason why the arrangement should not be extended to the smaller in-line air-cooled engines, unless it is ruled out on the score of expense. As, however, this article is intended to be analytical and not critical, we will pass on to consider valve gears and valve arrangements as they are rather than as they might be, though one looks forward to the reintroduction of the "L" or even the "T" head in the not too distant future, particularly with reference to engines of the radial type, unless insuperable cooling difficulties are encountered.

Valve Gear.—Regarding the number of valves per cylinder, more than two are used only in those air-cooled engines having cylinders of over 5½ in. bore, with the exception of the air-cooled Isotta-Fraschini twelve-cylinder 420 h.p. V-type, which incidentally was the only foreign air-cooled engine in the Show having four valves per cylinder. In practically all cases the valves are inclined, with the exception of the in-line engines, in all of which they are arranged vertically side-by-side. In passing, it is of interest to observe that in nearly all cases the arrangement of the overhead valve gear, appears to prevent the placing of the sparking plugs in the most desirable position, namely somewhere near the centre of the combustion head. The Pobjoy provides a notable exception to this rule and furthermore is the only radial among those under consideration in which the push rods are located at the rear of the cylinders. Reverting to the subject of the amount of space occupied by the overhead valve gear a feature of the Salmson design is that a considerable economy of space is effected by the use of a special form of valve spring, known as the "mouse-trap" or "hairpin" type. This form of spring comprises a horizontal coil having two parallel limbs, one limb being fixed whilst the other engages a fitting secured to the end of the valve stem, the coil flexing torsionally ; this form of spring was employed on Sunbeam motor cycles some few years ago, and has been a feature of Salmson engines since about 1912. The Salmsons provide the only exception to the usual double or triple concentric helical coil valve springs.

The rocker bearing and lubrication arrangements vary considerably though the main tendency appears to be to fit ball or roller bearings and thus to reduce the necessity for lubrication to a minimum. The four-cylinder in-line engines form the exception to this tendency, as they all have plain rocker bearings. Among the radials some effort is at last

being made to protect adequately the valve gear, it being completely enclosed in many cases. The valve enclosure has been very neatly carried out in some of the foreign engines, notably the Farman and Fiat, but in the latter case the method employed, of casting the lower portion of the rocker housing very close to and integral with the head and providing generous heat conducting cross sections throughout, is open to criticism on account of the liability of the contents to be "cooked" in their neat little housings. Some foreign engines even have enclosed push rods. The Argus provides an interesting example of a totally enclosed valve gear as applied to a four-cylinder in-line engine. At the other end of the scale is the completely exposed rocker gear which is still employed on half the total number of engines exhibited, although it should be stated that in most cases the actual rocker bearings are fairly well protected. Intermediate between these extremes are engines fitted with housings which partially enclose the valve gear, notably the Bristol Mercury, which engine further provides a good example of compact overhead valve arrangement, the amount of space occupied in the direction of the axis of the bore having been reduced to a minimum, for a valve gear of this type.

In the matter of temperature compensation, *i.e.*, the maintenance of correct tappet clearances, this has been attempted on most of the larger engines and also on one of the smallest, namely, the Pobjoy. The Bristol engines still hold pride of place as being the most thorough in this respect, although the recent change in head design involving the placing of the rocker pivotal axes at 90° to their former positions has prevented the employment of the original scheme as used on the earlier Jupiters; the method adopted for getting round the difficulty is in fact highly ingenious. In the case of all the larger British radial engines the rocker spindles are mounted in carriers which are hinge-jointed to the cylinder heads at one end whilst the other end is anchored either to the crankcase, as on the Bristols, or to the cylinder barrel some distance below the head, the anchorage members being of Invar, as in the case of the Armstrong-Siddeleys. The latter scheme is also employed on the Salmson 500 h.p. 18-cylinder engine, this being the only foreign engine in which any compensation has been attempted, all the other foreign makers being content to secure the rocker brackets direct to the cylinder heads. Incidentally, the Walter representative informed one that most careful tests had been made before deciding on this course, which is of particular interest in view of the fact that Jupiter engines are made by Walters under licence; it should be remembered however, that there is a considerable difference in cylinder dimensions between the Jupiter and any of the Walter engines. In the case of the larger in-line engines the difficulty does not arise as they have overhead camshafts. The following summary indicates in what proportions the various valve arrangements are distributed among the air-cooled engines, these being as follows:

	Per cent.
Exposed rocker gear	50
Completely enclosed rocker gear (excluding overhead camshaft)	22·5
Partially enclosed rocker gear	17·5
Overhead camshaft (totally enclosed) ...	7·5
Slide valve	2·5

The only engine in the show having slide valves was the Statax barrel-type rotary. One refrains from commenting upon any of the novel features embodied in this engine until it has had a chance of showing its worth, but it may be fairly assumed that if slide valves prove workable in an engine of this type they could be applied with a greater certainty of success to any radial engine, in which the operating conditions would be more favourable, and they would materially assist in reducing the size and weight of any type of aero engine in which they could be employed.

The valve gear of the only other axial or barrel-type engine in the Show, the Redrup, could not be classified in the above summary, as it does not properly fall into any of the types enumerated. It is certainly totally enclosed, but although the valves are *in* the head their arrangement is not overhead in the conventional sense, as they are set at right angles to the axis of the bore, and also they are actuated through short tappets by a simple and very compact form of cam gear. The arrangement of the valves and their actuating gear may be counted as further points in favour of the type if the design proves successful; the future of this engine will be watched with great interest.

Crankcases.—Perhaps the chief interest in the matter of crankcases attaches to the material employed rather than to the actual design, although so far as radial engines are concerned they may be divided into two main types, *i.e.*, those having the centre or body portion split in the plane containing the cylinders and those having the centre portion in one casting. The split body is the more popular, as 60 per cent. of the radial engines shown had crankcases of this type. With regard to the choice of material the Bristol engines are alone in having drop forged duralumin crankcases, although the crankcase of the Mercury is, one believes, of aluminium-magnesium alloy. The lighter alloys are, however, used by some of the Continental manufacturers for their crankcases, notably the Argus, Colombo, Isotta-Fraschini and Mercedes-Benz. An aluminium-magnesium alloy known as Electron is used for all those mentioned, whilst Alpax, an aluminium-silicon alloy, is employed for the crankcase and cylinder block casting of the Statax. These alloys do not appear to be generally popular with British manufacturers, most probably on account of their lower resistance to corrosion.

With reference to the various forms of crankcase perhaps the most interesting is that of the Fuscaldo, in which the body portion is shaped to continue the contour of the spinner fitted over the three-bladed variable pitch airscrew, whilst an annular rearward extension of the body, also maintaining the smooth exterior and contour of the forward portions, forms both the mounting and the engine oil tank. Thus the necessity for cowling is obviated, the crankcase and oil tank unit forming a complete nose fitting for a "power-egg" or for a fuselage having a nose of circular cross-section. This arrangement would appear to have many points in its favour for a medium sized engine, although the housing of all the auxiliaries at the back of the engine within the circular space surrounded by the oil tank casting may not be in the best interests of accessibility.

In all the in-line engines excepting the Colombo the crankcase also forms an oil reservoir, a fact that should have been noted with reference to the table given in the previous instalment, as otherwise this engine is given an unfair advantage over its rivals in the matter of weight/power ratio. With the exceptions of the Isotta-Fraschini, the Argus and the Renault, all the in-line engines have the crankcase in two portions bolted together on the plane containing the crankshaft axis. In the Isotta-Fraschini the crankcase is in three parts, the third portion forming a detachable oil tray at the base of the crank chamber. In the Argus (inverted four cylinder in-line), the joint occurs above the crankshaft axis, the whole of the upper portion forming an oil tank, whilst in the Renault the crankshaft bearing housings are bolted to the webs of the upper portion, the bottom of the case forming an oil base and cover only. The crankcases of the other types of engines do not call for special comment.

Crankshafts, Connecting Rods and Bearings.—The main interest in the matter of air-cooled engine crankshaft design centres around the choice between the two types employed in the radial engines, the one-piece or the built-up. The former type is slightly the more popular as it is used in 58 per cent. of the radial engines under review. In each of these engines the connecting rod assembly is of the type employing a split and white-metal lined master rod big-end, but among the radial engines having built up crankshafts the choice of big end bearing lies between the roller or the floating bush types, the latter being only slightly more in evidence (55 per cent.) than the former. The crankshaft journal bearings of the radial engines are of the ball or roller type throughout with the exception of the Pobjoy, which has a floating bush bearing on the forward side of the reduction gear pinion, the two main journals being of the roller type.

(To be continued.)

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

REPORT of Meeting of The Committee of the Royal Aero Club held at 3, Clifford Street, London, W.1, on Thursday, October 3, 1929, at 5 p.m.

Present : Lieut. Col. M. O'Gorman, C.B., in the Chair, Griffith Brewer ; Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S.; Colonel F. Lindsay Lloyd, C.M.G., C.B.E. ; Lieut.-Col. Sir Francis K. McClean, A.F.C. ; F. Handley Page, C.B.E. ; Major H. A. Petre, D.S.O., M.C. ; Capt. C. B. Wilson, M.C. ; H. E. Perrin, Secretary.

Election of Members.—Captain Leslie William Charley, Captain Gerald Newenham Deane, Flying Officer Robert Crook Greenhalgh, Stewart Jewell Grose, Edward Cayley Harrison, Cedric Spencer Horne, Squadron Leader Reginald Frederick Leslie, Major Selden Herbert Long, Flying Officer Geoffrey E. G. Lywood, Pilot Officer John Lewis Owen, L. H. Pomeroy, Louis Thomas R. Ridley, The Right Hon. Sir Philip Sassoon, Bart., P.C., G.B.E., C.M.G., M.P., Flying Officer Hugh Seymour Eaton, Leslie Harold Freeman, George Curtis Holt, Flying Officer Herbert John Horsey, Captain John Duckworth Irving, Trevor Stanley Sheen, The Hon. John Michael Southwell, Captain Francis St. Blase Stanley, Flight-Lieut. Frank Arthur Swoffer, Thomas Thistlethwayt, Raymond William Ryan, Armand Bovier.

Aviators' Certificates.

8655 Harold Foote, Lancashire Ae. C.
8656 Joseph Dawson Paul, Norfolk & Norwich Ae. C.
8657 Joseph Hanford Stevens, Midland Ae. C.
8658 Mark William Purser, London Ae. C.
8659 David Auld Graham, Scottish Fl. C.
8660 Walter Dugald Macpherson, Heston Air Park.
8661 Joyce Maude Pike, Hampshire Ae. C.
8662 Amy Johnson, London Ae. C.
8663 Ernest Leslie Gosling, London Ae. C.
8664 Herman Oscar Serck, Lancashire Ae. C.
8665 Joseph Cleverley Lister, Lancashire Ae. C.
8666 Henry Gair Greg, Lancashire Ae. C.
8667 Richard Barlow, Lancashire Ae. C.
8668 Robert Owen Wilcoxon, Midland Ae. C.
8669 William Geoffrey Eatherley, London Ae. C.
8670 Harry Earle Garland, Suffolk & Eastern Counties. Ae. C.
8671 William John Warburton, De Havilland Fl. School.
8672 George Newman Horne, London Ae. C.
8673 Frederick John Mouat Wilkens, Newcastle Ae. C.
8674 Leonard St. Clair Ingrams, London Ae. C.
8675 Arvid Harry Jonas, Henderson Fl. School.
8676 Philip Beech Hackett, Midland Ae. C.
8677 William Guna Tilleke, Midland Ae. C.
8678 Hon. Richard Westenra, Bristol & Wessex Ae. C.
8679 Maurice Heuston FitzGerald, Cinque Ports Fl. C.
8680 Leonard Marshall Leaver, Bristol & Wessex Ae. C.
8681 Cecil William Duffie, Newcastle Ae. C.
8682 William James Pickthorn, Norfolk & Norwich Ae. C.
8683 Alfred Smithson Gallimore, Nottingham Ae. C.
8684 John Ezekiel DuBois, Junr., De Havilland Fl. School.
8685 George John Scaramanga, London Ae. C.
8686 William George Andrews, Heston Air Park.
8687 Frank Donald Scott, Midland Ae. C.
8688 Charles Herbert Lowe-Wylde, Hampshire Ae. C.
8689 Gladys Mary Grace, Hampshire Ae. C.
8690 Urquhart William Thomas Endacott, Hampshire Ae. C.
8691 Rupert Syme Macalister.
8692 Cosmo William Wright, Newcastle Ae. C.
8693 Frederick James Addison, Newcastle Ae. C.
8694 William Heathcoat Amory, Bristol & Wessex Ae. C.
8695 Arthur Norman Brunning, Surrey Flying Services.
8696 Walter Lyndon Stoddon, Newcastle Ae. C.
8697 Kenneth Moncrieff Proctor, Newcastle Ae. C.
8698 George Hunter Lloyd, Yorkshire Ae. C.
8699 John Roland Bond, Midland Ae. C.
8700 Ferdinand Dudley Henry Lea-Smith, Brooklands School.
8701 Andree Peyre Turner, Heston Air Park.
8702 Adam Carter Bailey, Jnr., Liverpool & District Ae. C.
8703 Frederick Augustus Mariner, Hampshire Ae. C.
8704 Anthony Christopher Loraine Rendel, London Ae. C.
8705 Kenneth Abinger Whittome, Midland Ae. C.
8706 Hermon Collins, Yorkshire Ae. C.
8707 Josiah William Tomkins, Midland Ae. C.
8708 Fred Walpole Palmer, Norfolk & Norwich Ae. C.
8709 Herbert George Eric Tower, Midland Ae. C.
8710 Francis George Robinson, Midland Ae. C.
8711 Arthur Hamil Westwood, Midland Ae. C.
8712 Nathaniel Stuart Chalmers, Hampshire Ae. C.
8713 Cecil Stanley Burney, Brooklands School.
8714 Abraham Eyre Chatterton, Henderson Fl. School.
8715 William Randle Starkey, Suffolk & Eastern Counties. Ae. C.
8716 Edward Julian Cowan King-Salter, Suffolk & Eastern Counties Ae. C.
8717 Keith Stacey Neale, Midland Ae. C.
8718 Cecil William Browne, Norfolk & Norwich Ae. C.
8719 Cyril Edward Hurst, Nottingham Ae. C.
8720 Thomas Langley Webb, Heston Air Park.
8721 Harry Scott Taylor, Lancashire Ae. C.
8722 Arthur Edward Neale, Bristol & Wessex Ae. C.
8723 Walter Robert Dempster Perkins, Heston Air Park.
8724 Edward Lesley Donner, Household Brigade Fl. C.
8725 Dunstan Ripley, Suffolk & Eastern Counties Ae. C.
8726 Ernest Vair Sleigh Lacey, R.A.F. Grad. Cert.
8727 Roland Ruutz Rees, Brooklands School.
8728 William Leslie Wilson, Liverpool & District Ae. C.
8729 Jack Goddard Anderson, Newcastle Ae. C.
8730 William Mervyn Staley Fox, Liverpool & District Ae. C.
8731 Audrey Florice Durell Drummond-Salg-Barker, National Flying Services.
8732 George David Shellagear, Brooklands School.
8733 Douglas Warner Bond, Liverpool & District Ae. C.
8734 Sir Robert George Maxwell Throckmorton, Bart., Household Brigade Fl. C.
8735 Elizabeth Ann Roche Anderson, Scottish Fl. C.
8736 Captain Earl Amherst, Household Brigade Fl. C.
8737 Margaret Helen Saunders, Henderson Fl. School.
8738 Francis Charles Chichester, Brooklands School.
8739 Edward Henry Allen, London Ae. C.
8740 John Charles Edgar, Liverpool & District Ae. C.
8741 George Nevill Conyngham Smyth, Liverpool & District Ae. C.
8742 John Roskell Reynolds, Liverpool & District Ae. C.
8743 William Brereton Lawton-Goodman, Liverpool & District Ae. C.
8744 The Hon. Miss Mildred Katherine Leith, London Ae. C.
8745 Greville Archibald Fitzpatrick Vernon, Hampshire Ae. C.
8746 John Ferrar Perkins, Liverpool & District Ae. C.
8747 James Paul McGeagh, Liverpool & District Ae. C.
8748 Walter Arnold Rogers, Liverpool & District Ae. C.
8749 Richard John Turney Granger, Nottingham Ae. C.
8750 Richard Ince, Heston Air Park.
8751 Marcus Michael Kaye, National Fl. Services.
8752 Arthur Edward Coltman, Midland Ae. C.
8753 Dulcis Marie Miriam Margaret Mendoza Eills, Liverpool & District Ae. C.
8754 George Elliot Waterworth, Liverpool & District Ae. C.
8755 Arturo Asturizaga Matos, Brooklands School.
8756 Diana Guest, Heston Air Park.
8757 Ernest John Griffiths, Newcastle-upon-Tyne Ae. C.
8758 John Raymond Ashwell-Cooke, Cinque Ports Fl. C.
8759 Sydney Joseph Verner Furlong, Cinque Ports Fl. C.
8760 Herbert Henry, National Fl. Services.
8761 Robert William Anderson, Liverpool & District Ae. C.
8762 William Galilee Eills, Liverpool & District Ae. C.
8763 Robert Thompson Liddell, Newcastle-upon-Tyne Ae. C.
8764 Howell Effingham Davis, Bristol & Wessex Ae. C.
8765 Sydney Mark Sail, Nottingham Ae. C.
8766 Neil Henderson Smith, Bristol & Wessex Ae. C.
8767 Thomas Hornby Williamson, Liverpool & District Ae. C.
8768 Joseph Edgar May, Suffolk & Eastern Counties Ae. C.
8769 Stephen Gerard, Surrey Fl. Services.
8770 Francis Norman, Midland Ae. C.
8771 Frederick Tracey Lydall, Midland Ae. C.
8772 Harold Edward Evans, Midland Ae. C.
8773 John Michael Hodges, Bristol & Wessex Ae. C.

8774 Temple Frederick Sinclair, Heston Air Park.
8775 Harold Bourne Taylor, Henderson Fl. School.
8776 Frederick Edward Guest, Heston Air Park.
8777 Alexander George Victor Paley, Suffolk & Eastern Counties Ae. C.
8778 Lady Somers, London Ae. C.
8779 Mrs. Christina Mitchell Young, Suffolk & Eastern Counties Ae. C.
8780 Arthur Leighton Angus, Hampshire Ae. C.
8781 Hedley Ernest James Kingston, Hampshire Ae. C.
8782 James Jerram Briggs, Brooklands School.
8783 George Maitland Christian Brooklands School.
8784 Charles Bernard Baker, Brooklands School.
8785 Capt. Gerald William Ferguson, National Fl. Services.
8786 Brian Douglas Armstrong, London Ae. C.
8787 Oscar Carel Baron Taets van Amerongen, Henderson Fl. School.
8788 Hamish Francis Armstrong, London Ae. C.
8789 Thomas Stamer Beresford Gubbins, Cinque Ports Fl. C.
8790 Robert Anthony Rioch, Bristol & Wessex Ae. C.
8791 Cyril Henry Hyde, Cinque Ports Fl. C.
8792 Philip Fotheringham-Parker, Cinque Ports Fl. C.
8793 Alban Hyder Usuf Ali, Newcastle Ae. C.
8794 Harry Gordon Selfridge, Jnr., De Havilland Fl. School.
8795 Gerard Petit, National Fl. Services.
8796 Geoffrey William Houlding, London Ae. C.
8797 Sir Bruce Fraser Stewart, Bart., Cambridge Ae. C.
8798 Hon. Denys George Finch Hatton, Bristol & Wessex Ae. C.
8799 Dudley Francis Osmaston, National Fl. Services.
8800 Christopher Goring, Henderson Fl. School.
8801 George Percy Haylock, Midland Ae. C.
8802 Philip Stone, Midland Ae. C.
8803 Mrs. Rosamond Vereker, Midland Ae. C.
8804 Hugh Stanley Turner, Hampshire Ae. C.
8805 Berners Plestow Aymer Vallance, Midland Ae. C.
8806 Harold Anthony Taylor, Midland Ae. C.
8807 John Eversleigh Kendrick, Newcastle Ae. C.
8808 Eric Stephen Lambert, Cinque Ports Fl. C.
8809 Anthony Pleydell-Bouverie, Hampshire Ae. C.
8810 George Humphrey Winn, Hampshire Ae. C.
8811 Richard Johnson Wootton, Brooklands School.
8812 Edwin Hanson Freshfield, Henderson Fl. School.
8813 Harry Thomas Molyneux, London Ae. C.
8814 David Thomson, Midland Ae. C.
8815 Kenneth Herbert Potter, Bristol & Wessex Ae. C.
8816 Isabel Surtees, London Ae. C.
8817 Yeshwantrao V. Ghatge, Nottingham Ae. C.
8818 Thomas George Ellison, Midland Ae. C.
8819 Capt. William Newton Lancaster, R.A.F. Grad. Cert.
8820 Hugh Arthur de Symons Barrow, Airwork School.
8821 John Turner de Fraine, Phillips & Powis School.
8822 John Henry Abel Chapman, Brooklands School.
8823 Ronald Basil Bowen Bancroft Cooke, Airwork School.
8824 Roderic Davies Berrington, London Ae. C.
8825 Michael Cipriani, De Havilland Fl. School.
8826 Richard Grainger Jeune Nash, Phillips & Powis School.
8827 James Evelyn Foster, Brooklands School.

Flight to India and Back.—It was unanimously resolved to award the Club's Gold Medal to Capt. C. D. Barnard in recognition of his flight to India and back in eight days, August 2 to 9, 1929.

It was also unanimously resolved to present the Duchess of Bedford with an Illuminated Address of Congratulation.

World's Records.—The official reports in connection with the following performances were considered and were directed to be submitted to the F.A.I. for acceptance as world's records :—

100 *Kilometres on a Closed Circuit* :—

September 7, 1929. 14 hrs. 19 mins. Flying Officer H. R. D. Waghorn. Supermarine Rolls-Royce S.6. Speed, 330·1 m.p.h. = 531·2 k.p.h.

September 7, 1929. 16 hrs. 8 mins. Flying Officer R. L. R. Atcherley. Supermarine Rolls-Royce S.6. Speed 331·6 m.p.h. = 533·8 k.p.h.

Greatest Speed over 3-*Kilometre Course* :—

September 10, 1929. Flight.-Lieut. G. H. Stainforth. Gloster Napier VI. Speed, 336·3 m.p.h. — 541·100 k.p.h.

September 12, 1929. Squadron Leader A. H. Orlebar. Supermarine Rolls-Royce S.6. Speed, 357·7 m.p.h. — 575·700 k.p.h.

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W.1.
H. E. PERRIN, Secretary.

Banquet to Marquis de Lambert

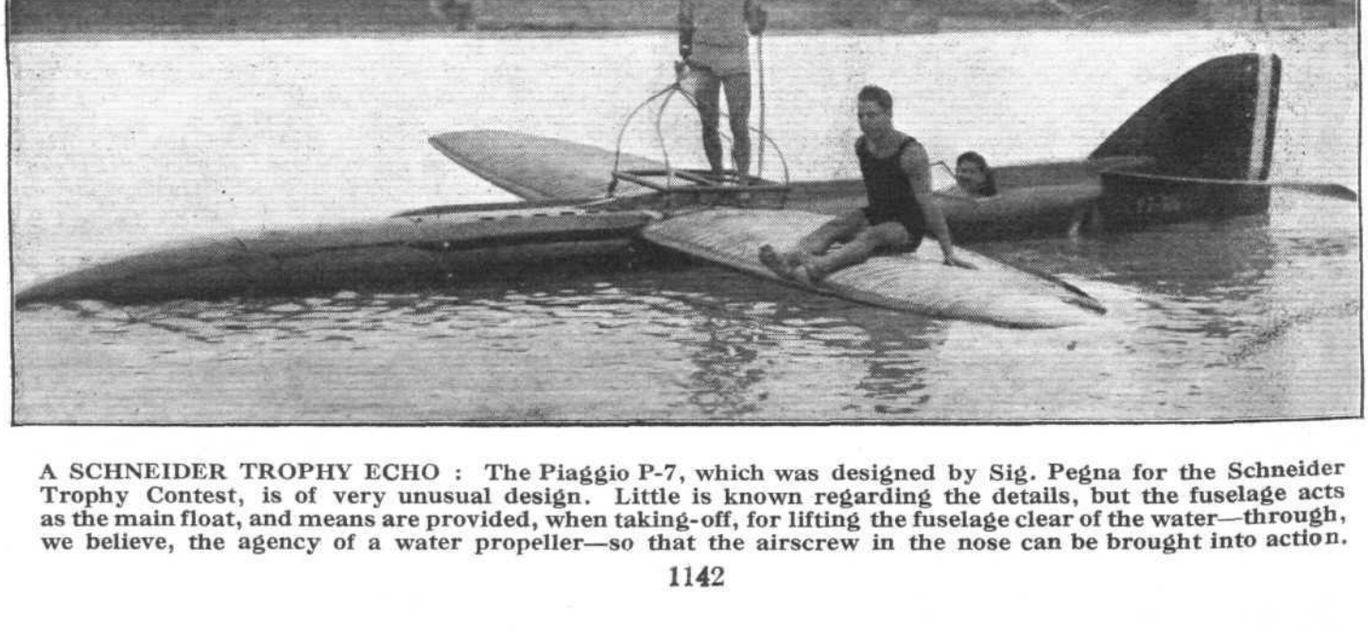
THE Aero Club de France is giving a banquet on November 4 in honour of the Marquis de Lambert, who made the first flight over Paris on October 18, 1909.

"My Solo Flight to Australia"

ONE of the series of Illustrated Talks which are being given next month in aid of the King Edward's Hospital Fund will be delivered by Sqdn.-Ldr. Bert Hinkler, on "My Solo Flight to Australia." It will take place on November 13 (5.30 p.m.) at the Westminster School Hall (Dean's Yard), Col. The Master of Sempill presiding. Prices of admission will be 2*s.* 6*d.*, and numbered and reserved seats, 5*s.* Tickets may be obtained from Miss Roud, School Bookshop, Westminster School, and further particulars of this and other talks from the Hon Sec., King Edward's Hospital Fund, 7, Walbrook Street, E.C.4.

Oxford University Air Squadron H.Q. Extension

THE Secretary of State for Air, Lord Thomson, will open an extension of the Oxford headquarters of the University Air Squadron.



A SCHNEIDER TROPHY ECHO : The Piaggio P-7, which was designed by Sig. Pegna for the Schneider Trophy Contest, is of very unusual design. Little is known regarding the details, but the fuselage acts as the main float, and means are provided, when taking-off, for lifting the fuselage clear of the water—through, we believe, the agency of a water propeller—so that the airscrew in the nose can be brought into action.

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Yours faithfully,
BROOKLANDS SCHOOL OF FLYING LTD.
(*Signed*) H. S. HAMILTON,
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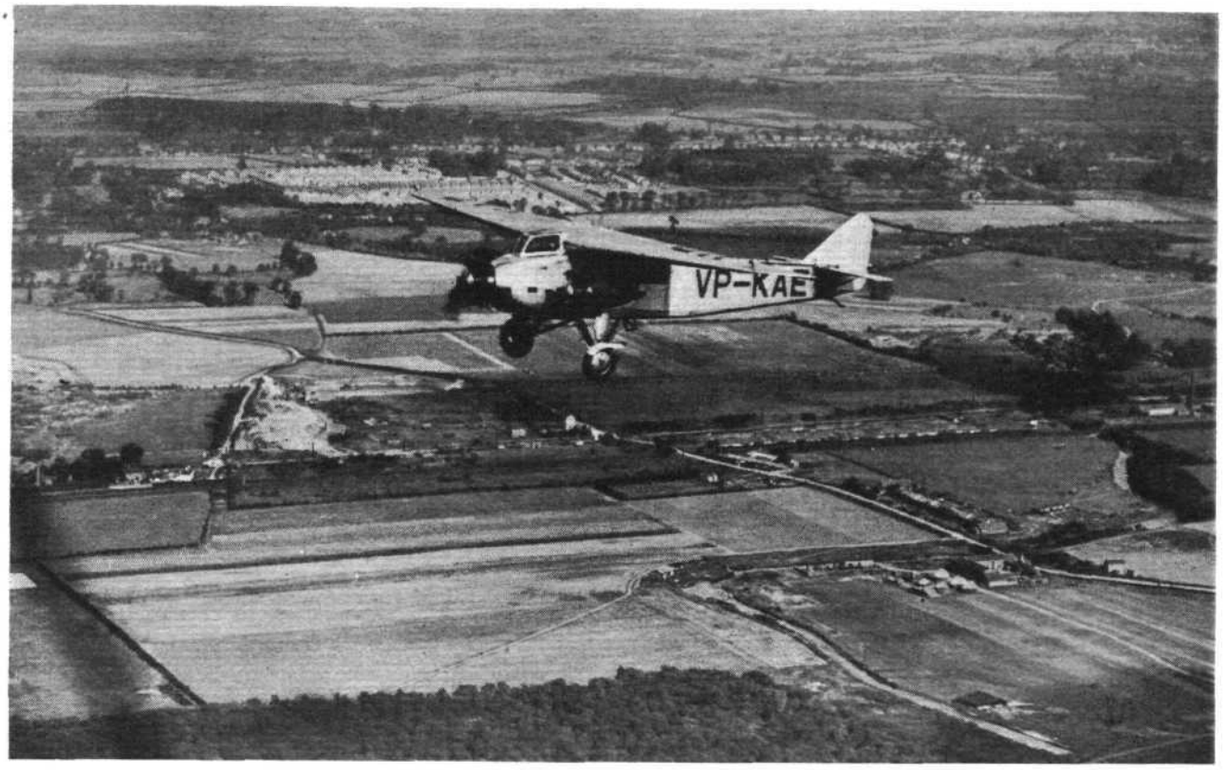


AN AVRO V (3 GENET MAJOR ENGINES) FLYING IN THE NEIGHBOURHOOD OF HESTON: Sold to Wilson Airways, Limited, this machine is to be put into service in Kenya. (FLIGHT *Photo.*)

AVROS FOR OVERSEAS

ALTHOUGH the new Avro monoplanes, the type V and the type X, were first shown to the general public at the Olympia Aero Show in July, both types already promise to attain considerable popularity, being three-engined machines, with the freedom from forced landings which is associated with three separate power units, and of small and medium size respectively. The Avro "five," it will be recollected, is a five-seater (pilot and four passengers), and the "ten" a 10-seater (eight passengers, pilot, and engineer). The Avro V is fitted with three Armstrong Siddeley "Genet Major" engines, while the Avro X has three Armstrong-Siddeley "Lynx" engines.

One Avro V, illustrated in the photographs, has recently been sold for passenger transport purposes to Wilson Airways, Ltd., and is to be put into service in Kenya. Already it carries the registration letters VP-KAE. It is believed that the machine may be flown out to Kenya shortly. This particular machine has, according to data painted on the side of the fuselage, a tare weight of 3,038 lbs., a petrol load of 900 lbs., an oil capacity of 112·5 lbs., and a total permissible maximum weight of 4,630 lbs. The machine has been christened "Knight of the Grail."

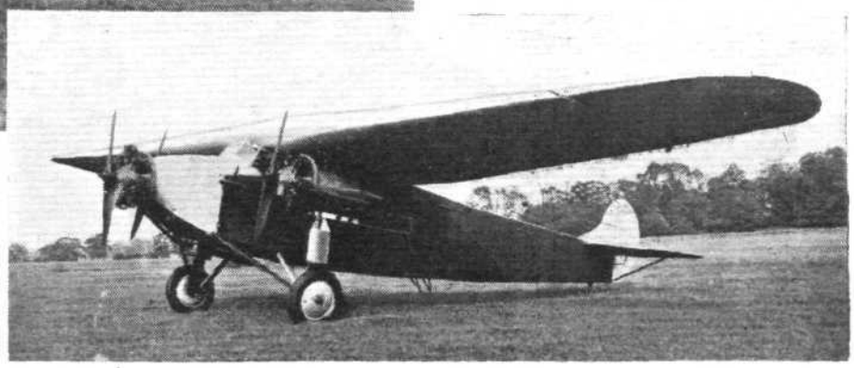
The "Knight of the Grail" is a very up-to-date little aircraft, with comfortable seats for four passengers. We believe that it is actually the machine exhibited at Olympia, with certain modifications made since the Show. The pilot's cockpit, from which a very excellent view is obtained, is reached through a door in the front wall of the cabin, and

THE AVRO V: This machine is not, as its registration letters might lead one to believe, the property of the Kodak Company, but of Wilson Airways, Ltd. It is here seen taking off from Heston Air Park. (FLIGHT *Photo.*)

behind the cabin is a large luggage compartment. Such refinements as independently-operated wheel brakes are fitted, and the machine handles remarkably well on the ground, the brakes, in conjunction with the outboard engines, enabling her to turn in a very small radius. When pulling up fairly sharply, there is no noticeable tendency for the tail to come up.

Whether the wheels are a little farther forward than usual we do not know. A very similar machine has been sold for service in Queensland, Australia, and two more for air survey in the Sudan—a class of work for which this type should prove useful.

Recently Sqdn.-Ldr. Kingsford Smith and Flight-Lieut. Ulm visited the Avro works at Manchester to inspect some Avro "tens," four of which have been ordered for use on the Brisbane-Sydney service in Australia. A Queensland operating concern has bought another Avro "ten," while several other firms are showing interest in the type, so that one way and another, the two types are already beginning to make their way in the world.



On the left, the Avro V sold to Wilson Airways, Ltd., and to be used in Kenya, and below an Avro X (3 "Lynx"), of which several are to be put into service in Australia.

THE AVRO V: This illustration shows the placing of the three Genet Major engines. A very wide wheel track and independently-operated wheel brakes are features of this machine, which carried four passengers in addition to the pilot. (FLIGHT *Photo.*)

BOOK REVIEWS

"THE WORLD, THE AIR AND THE FUTURE"

"MAN and his relation to God in the Past, Present and Future" is said to have been the title chosen for his sermon by a vicar. Scarcely less comprehensive is the title which Commander Sir Dennis Burney has chosen for his book "The World, the Air and the Future," published by Alfred A. Knopf, price 21*s.* net. History fails to relate how exhaustively the vicar dealt with his subject, but Sir Dennis manages, in some 356 pages, 31 illustrations and 2 maps, to cover his ground very thoroughly.

The book is one which should be read and re-read by everyone who has the courage to look ahead (for courage it requires) and to try to visualise what is likely to happen to this far-flung Empire of ours if we do not make up our minds, and that at once, to make the fullest possible use of the air. Sir Dennis attacks, and with very considerable justification, the air policy hitherto followed by Great Britain. If he were in need of further proof and support, the statistics given in the recently published Annual Report on the Progress of Civil Aviation, 1928, supply it, showing as they do the insignificant place occupied by Great Britain in comparison with such countries as Germany and the United States of America. And yet the British Empire, scattered as it is over the whole globe, has much more to gain by using the air than has any other nation in the world. The need for and advantages of air transport are admirably dealt with in this book. In fact, we do not recollect ever having read anywhere a work which so convincingly brings out the vital necessity of taking the fullest possible advantage of the saving in time which flying has to offer. Few will disagree with Sir Dennis when he states that "at the present time, Imperial patriotism is with most of us rather a vague sentiment, or, at best, an inspiring thought; it is not yet the fundamental reality of our political life. It has not yet acquired the force of a religion, like the feeling for 'Imperium Romanum' among the Romans."

"It is quite clear," Sir Dennis writes, "that if our loose-knit, far-flung Commonwealth is to function effectively as an Imperial entity, its member states must be welded together into a physical unity; and it is equally clear that with the present system of communications, physical unity in any real sense is an unattainable ideal."

The statement "Nations that are far apart soon lose their sense of kinship, just as family affection weakens between relatives who never see each other, and does not survive the passing generation; while the difficulty of forming economic ties increases with the distance that separates the parties concerned" may appear obvious. Yet how many fully realise the truth of it? And one must agree with the author when he states that "The future of the Empire lies in the air. It is no exaggeration to say that not only its economic and political development, but its continued existence, depends on our capacity to establish within the next generation an efficient system of Imperial air communications." The author approaches the subject along three lines: Redistribution of population, commercial and economic expansion, and Imperial sentiment and cultural unity. His arguments are thoroughly convincing. His quotation of the case of a friend of his, an ex-schoolmaster, who was thinking of taking up an appointment in New Zealand, but who after mature consideration abandoned the idea because it meant cutting himself off from all that he valued at home, expresses admirably the attitude of many educated Englishmen towards the idea of taking up permanent domicile in one of the more distant parts of the Empire. "There will," Sir Dennis writes, "be no more severance of home ties when the farthest corner of the Empire will be within a week's journey of the Mother Country, and within a fortnight's reply to correspondence."

In another chapter Sir Dennis Burney deals with the problems of defence, and considers them under their Imperial and International aspects. At a moment when we have, perhaps, succeeded in approaching more closely than ever before to an understanding with America, Sir Dennis' conclusion that Anglo-American friendship is the keystone to world peace deserves to be studied carefully by every thinking man and woman.

Curiously enough, and wholly surprisingly, it is when Sir Dennis Burney turns from the general problems of air communications to the more specific question of airship or flying boat (the two rival types on the long air routes of the future) that he is least convincing. As the head of the private company which has designed and built R.100, one might reasonably have expected him to put up a good case for airships. Yet the most which Sir Dennis can be said to have achieved with the section of his book dealing with airships is to claim that the design and construction of R.100 and R.101 has taught us much technically, but that as they stand they are of no commercial value. Sir Dennis even calls in Mr. Spanner, the well-known airship antagonist, to prove his point! The reader of the various books by Mr. Spanner might be forgiven for being in grave doubt as to whether airships are ever likely to be of any use. We are very much afraid that after reading Sir Dennis Burney's chapters on airships, the reader will feel quite convinced that airships will never be of any use whatever. Although, presumably, that was not the author's intention.

Briefly, Sir Dennis Burney argues that the present airships have far too low a cruising speed, have come out too heavy, and that to increase their speed would further increase their weight and reduce their useful load. And his only suggestion of a way out of the difficulty is to increase the size to nearly two and a-half times that of the two airships just completed! It is extremely difficult to see any technical justification for believing that increase in size, at any rate to this extent, will necessarily enable us to increase both the speed and the proportionate pay load. We seem to recollect that when R.100 and R.101 were laid down, the same arguments were used. At the time we had in England no experience of airships larger than a little more than 2 million cubic feet. We seem to recollect that it was then claimed that the increase in size would enable a more efficient type of structure to be employed, while attaining much greater strength. The strength we now appear to have attained, but the structure weight is much "worse" than it was in some of the old airships. Sir Dennis himself states in his book that with the war-time Zeppelins, one could approximately take one-half of the weight as being represented by tare weight and crew, and the other half as fuel, ballast and bombs. Yet for R.100, Sir Dennis gives 92 tons for the tare weight, 4 tons for the crew and stores, and a total weight of 143·5 tons. In other words, the percentage of tare weight, crew and stores to total weight is about 67 per cent., as against 50 per cent. in the old Zeppelin. Admitted that R.100 may be very much stronger, no very good case for the advantage of size seems to have been made out.

The increase in size of airships has, on the contrary, very many drawbacks. Larger hangars have to be erected in which to build the larger ships. And the handling becomes much more difficult. As Sir Dennis himself points out, "man handling" becomes impossible, Sir Dennis suggests a weird cradle arrangement with claws to grip the airship at various points along her sides. We are afraid no engineer would agree with Sir Dennis as to the practicability of such an arrangement. Doubtless because Sir Dennis is, himself, somewhat doubtful about its practicability, he sugggests an entirely new type of airship, of elliptical cross section, to give greater dynamic lift, which has two cars, towards the sides of the airship, provided each with a sort of flying-boat hull for flotation. It is proposed that the ship should be flown off and on to the water, avoiding handling parties altogether. The idea is not new. The earliest Zeppelins floated on Lake Constance. But we very much doubt whether the sea-borne airship would really be any more practicable than is the cradle-with-claws arrangement.

We believe that a good deal more can still be done with the two airships just completed. The low cruising speed is, to some extent, made up for by the fact that the airship can travel throughout the 24 hrs., and is thus on approximately even terms with the heavier-than-air craft of twice its cruising speed, operating for 12 hrs. only. The pay load is not very large, perhaps, but in the case of R.101, at any rate, it will be increased a good deal when lighter compression-ignition engines are available. And specialists tell us that engines of about half the weight of the Tornadoes are already in sight as practical possibilities.

We are strongly opposed to launching out once more into the unknown with an ambitious airship programme, which includes building airships of 350 tons' weight. And for the following reasons: The construction of such airships would, judging from experience with R.100 and R.101, take at least five years. It would cost vast sums of money, and it seems likely that by the time the airships would be out and flying, we should have flying-boats capable of doing the same kind of work at far smaller cost, and with a minimum of ground organisation.

"MARCO POLO."

"AIR DEFENCE"

A Review on Maj.-Gen. E. B. Ashmore's Book.

THE Air Exercises of 1927 and 1928 provoked tremendous interest, not only among military students, but among the public in general. To the older people amongst us they recalled very unpleasant memories of the war and its air raids. Students, including press correspondents, strove hard to read the lessons and to interpret them. Special parties were conducted round and were allowed to see a very great deal, and to get a grip of the general scheme of defence. But much still remained dark. From visits to observer posts, to observer centres, to the headquarters of the fighting and bombing areas, and the official records of raids and combats, it was not too easy to see in one's own mind the connected story of air defence. Now at last that story has been told, frankly and apparently fully, by Maj.-Gen. E. B. Ashmore in a book entitled "Air Defence," published by Longmans Green at 8*s*.6*d*.

General Ashmore was in sole command of the air defence of London in the latter part of the war, and, as no air attacks were made upon London after May 19, 1918, he claims that the defence had mastered the attack. It did not master it by forbidding London to the German bombers, but by taking such heavy toll of those which came over, that air raiding became too expensive a policy. Since the Armistice, General Ashmore has been in command of the ground organisation side of air defence. He is therefore very highly qualified to write upon this subject.

General Ashmore has his own ideas. To him air defence means the defence of London. While admitting that the ideal thing would be to defend the whole of the British Isles, he says that in practice you must defend London. He holds also that London ought to be defended. Although he admits that only 180 per annum were killed in London by air raids and that the material damage amounted to £2,042,000 in the four years, while 200 first-class fighter aeroplanes and highly trained pilots were kept away from France, he still thinks that London ought to be defended, in case it should suffer "intolerably" on the sudden outbreak of war. Perhaps it is a case of air defence being General Ashmore's child; but we will leave it to higher strategists to dispute that point if they care to do so. Let us accept it that London ought to be defended and examine the conditions of its defence as General Ashmore sets them forth.

He insists upon certain points as necessary. One is absolute unity of command. Another is complete ground organisation. A third is the efficiency as a weapon of defence of the fighter aeroplane, with, as a corollary, the comparative ineffectiveness for defence purposes of the bomber aeroplane.

Unity of command is a point which has often been stressed in the pages of FLIGHT. Something depends upon the interpretation of the term. The commonly prevailing view is that there should be unity of command over everything which goes up into the air. Such a theory may have had its uses temporarily, while a start was being made with the organisation of the air. As a principle, it has been abandoned in Iraq, where the unity of command applies to the whole defence of the country, where the R.A.F. uses its own armoured cars and has command over such military units as remain in the country. As regards Great Britain, it has been urged repeatedly in these columns that there ought to be unity of command in air defence—a far more important thing than unity of command of all aircraft. Unity of command in air defence implies that the necessary ground units, *i.e.*, the searchlights and the anti-aircraft guns, should be absolutely under the command of the Air Ministry, and should not be borrowed from the War Office.

Our opinion is strikingly confirmed by General Ashmore (himself a soldier) who devotes no less than two and half pages (pp. 133-4-5) to an absolutely damning exposure of the faults of the present system. We should like to quote the whole of those pages, but must content ourselves with summarising them. The war and peace establishments of air defence troops must be the same. They must be at full strength and efficiency on the outbreak of war. At the start of the present scheme in 1924 it was intended that there should be expansion from year to year, but before the end of that year it became clear that so far as the War Office was concerned there would be no expansion at all.

In 1926 numbers were cut down, so that the existing batteries could not be manned. The troops, mainly Territorials, are under the R.A.F. for training and operations, but the money for them comes from Army votes.

The War Office has other interests, and in these hard times it is naturally reluctant to find money for a defence which is not under its control, "The ground troops have two masters pulling in opposite directions; the R.A.F. only want them to be efficient, the War Office only want them cheap." The War Office is not entirely to be blamed. It is the system which is at fault, and for that system the Air Ministry is partially responsible. General Ashmore reminds us that the Air Minister said, in 1924, that the Air Ministry should not be burdened with the administration of the ground troops. As a consequence, there are not enough men for the batteries and searchlights required, and, being Territorials, these men cannot be so highly trained as the fighter squadrons with which they have to work. The training of those squadrons costs a lot of money, which is partially wasted if the co-operating searchlights are not up to the mark. General Ashmore writes:—"The organisation of the defences has, in short, shown a fundamental weakness, due to divided responsibility between the War Office and Air Ministry"; and again, "The sooner the rest of the ground organization, the anti-aircraft guns and searchlights follow the Observer Corps and come under the Air Ministry for administration and finance as well as for operations, the better."

The absolute necessity for good ground organization is well brought out in the earlier chapters of the book, in which the history of the raids and the defence is given. Without close co-operation between searchlights and fighters, there were seldom any combats. The last three raids, in 1917, showed that altogether 49 enemy bombers came well over London, and 131 defending machines went up to meet them, only eight enemy machines were sighted by our pilots, with the result that there were three combats, and one enemy machine was shot down. In May, 1918, the defences were far better organized, with the result that when some 35 Gothas came over on the night of May 19, there were 12 fights, in which three Gothas were shot down, while three others, probably badly shot about, crashed on landing in Belgium, and yet another three were shot down by the guns. Yet the defence then was not nearly as strong as it is now. In the last air exercises, the day bombers made 57 raids, which were attacked 39 times on the way in, and 37 times on the way out. Only nine raids evaded the defences altogether. The umpires adjudged that 150 day bombers (about 200 per cent. of the original number) were shot down by fighters, while by night, the defence had things even more its own way. No bombing force in the world could stand casualties of 200 per cent. in four days. Yet at present, we have only provided perhaps one-fifth of the desirable Observer Corps communications and one-tenth of the searchlight communications—none at all of the gun station communications.

The conclusion which General Ashmore draws from all his experience is that with proper communications, news of a raid and of its course can be got through in time, that if the searchlights work really well the fighter squadrons will take heavy toll of the raiders, and that consequently, raids on London will stop as quickly as they did in May, 1918. He therefore rates the fighter aeroplane very high as a weapon of defence, and joins issue with the Chief of the Air Staff for his remark, made in 1928, that the aeroplane is a "shockingly bad weapon of defence." That description, he considers, only applies to the aeroplane when not properly aided by prompt information, wireless, and searchlights.

General Ashmore is less convincing when he argues that the defence cannot expect much help from the bombers. He writes on that subject with less personal knowledge and experience, and he adopts the dilemma form of argument, which is always weak. But he is very sound when he points out that nothing but a tremendous blow at the outset is at all likely to break the will to victory of such a city as London. A city which, in peace time, can tolerate 700 deaths per annum from streets accidents (in 1928 the figure was 1,252) can easily bear 180 deaths per annum from air raids. The attack will certainly be stronger in the next war, but so will be our power of retaliation, while our air defence, though it can never assure absolute immunity to London, will be immensely stronger than anything hitherto seen. One vital condition, however, is that the Air Ministry shall have the sole responsibility for air defence.

F. A. DE V. R.

THE FRENCH LONG-DISTANCE RECORD

Some Notes on the Non-Stop Flight of Costes and Bellonte

WE have already briefly reported in FLIGHT the splendid and successful attempt to beat the World's Non-Stop Long-Distance Record by the French airmen, Capts. Costes and Bellonte. This week we give a few further particulars, mainly concerning the Breguet machine used in this flight.

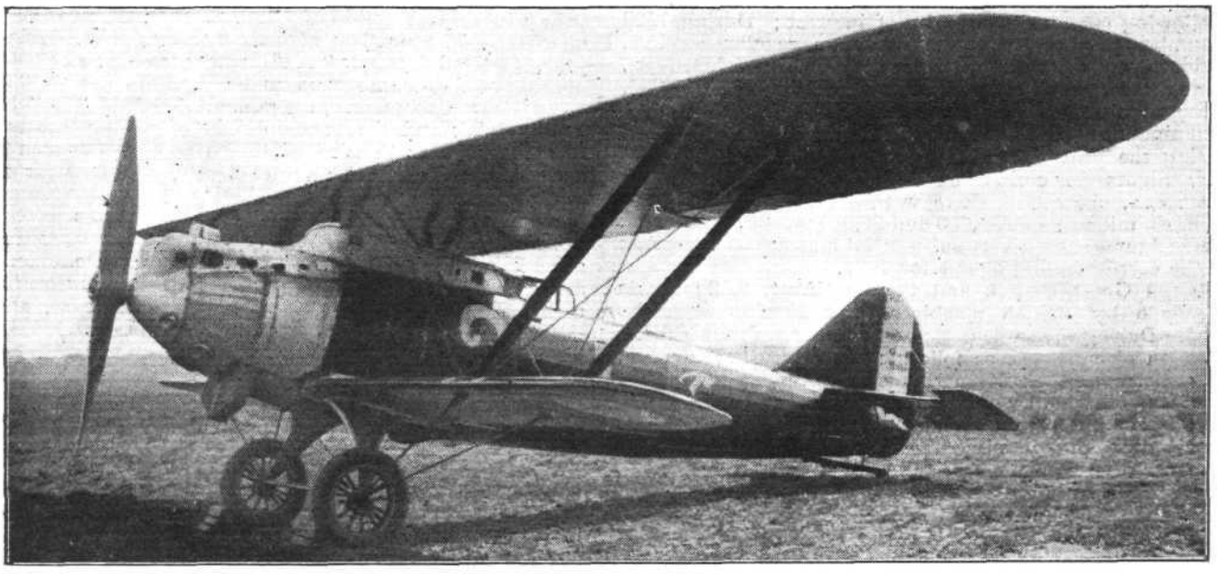
The airmen, it will be remembered, set out from Le Bourget on September 27, and after being reported over Novosimbirsk (3,750 miles from Paris) the following day, nothing more was heard of them for some days. Then came rumours that they had landed in some sparsely populated part of Siberia, and on October 6 the French Consul at Mukden telegraphed that they had made a safe landing, on September 29, about 32 miles north of Tsitsikar, in Manchuria, near the border of Mongolia. The machine was undamaged, but the petrol was exhausted.

On landing, the airmen were arrested by Chinese soldiers, who thought they were Russians and they proceeded to Tsitsikar under guard, arriving there on October 6; they were subsequently released. Costes and Bellonte were 51 hrs. 19 mins. in the air, and the distance flown was about 9,000 km. (5,600 miles), thus easily beating the previous record of 7,188 km. (4,466 miles) accomplished by the Italian pilots, Ferrarin and del Prete, in their flight from Rome to Brazil, in July of 1928.

Costes had announced before starting that he would fly toward the East and endeavour to reach as distant a point as possible, continuing as long as his supply of fuel lasted. His 'plane, the Breguet long-range sesquiplan, "Question Mark," had been specially designed and built this year for such an attempt. It is similar in general lines to the Breguet 'plane built for Costes in 1928, known as the Brequet "Tank Plane." This 1929 machine, however, has a fuel tank capacity of 1,365 gallons (5,780 litres) as compared to that of 1,100 gallons (4,100 litres) of the 1928 'plane. This additional fuel supply increases the flight radius from 5,000 miles to about 6,250 miles.

A centre section, 7 ft. 8 in. wide, has been inserted between the two upper wings, where they come together above the fuselage, thus giving an additional supporting wing surface. The wing gap has been increased 1 ft. 4 in. and the single strut between the upper and lower wings on each side of the fuselage has been replaced by two slanting stream-lined struts. About 3 ft. have been added to the length of the fuselage by increasing the section in front of the pilot. The landing gear has been widened to 8 ft. 10 in., in comparison to 6 ft. 5 in. of the 1928 'plane.

The enlarged fuel tanks have been installed in the wings and in the fuselage. The capacity of the lubricating oil tanks has been increased from 200 litres (52½ gallons) to 220 litres (60 gallons). Two additional fuel tanks, having a capacity of 600 litres (160 gallons) each, and well streamlined, have been designed, in addition, to be mounted on the underside of the lower wings under each pair of struts, should it be so desired.



The Long-Range Breguet, "Question Mark," on which the French airmen, Costes and Bellonte, recently flew 9,000 km. non-stop

The total weight of the "Question Mark," equipped for its long-distance flight, is 6,150 kg. (13,530 lbs.), as compared with the 5,150 kg. (11,330 lbs.) of the 1928 machine.

The "Question Mark" is equipped with a 600-h.p. Hispano-Suiza motor (Solex carburettors) with reduction gear. Carrying a load of 3,260 kg. (7,172 lbs.), this 'plane has shown the following performances:—Maximum speed at 2,000 m. (6,500 ft.), 150 m.p.h. (243 k.p.h.); climb to 5,000 m. (16,250 ft.), 26 mins. 54 secs.; theoretical ceiling, 6,700 m. (21,775 ft.).

The fuel consumption tests made recently by Costes have shown that the flight radius of the "Question Mark" is between 9,500 to 10,000 km. (6,000 to 6,250 miles) in a state of no wind prevailing.

R. C. W.

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The Royal Air Force Display

NEXT year's Royal Air Force Display (the eleventh) will be held at Hendon on June 28. New types of aircraft will be exhibited in a special park set apart for the purpose. It may be of interest to note that the official figures of admission to the 1929 Display were over 136,000 persons and 12,000 vehicles, while it is computed that some 400,000 persons were drawn to the Hendon-Mill Hill-Edgware area on July 13 by the Display.

Lady Heath

LADY HEATH, now well on the road to recovery, has taken a flat at Reno, Nevada, where she will stay during the next three months or so.

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H.M.S. "Engadine"

THE eleventh annual re-union dinner will be held at the Adelphi Hotel, John Street, Strand, on Saturday, November 9, at 6.30 p.m. Tickets, 6*s.* 6*d.* Particulars may be obtained from Arthur B. Ward, 135, Burbage Road, Dulwich, S.E.21.

Change of Address

NEW distributors of Edison Storage Batteries, Ltd., have now settled into permanent spacious offices on the sixth floor instead of the temporary offices on the fourth floor at their same address, Victoria House, Southampton Row, London, W.C.1. Telephone number is unchanged—Holborn 6673: Two lines.

CIVIL AVIATION

Publication of 1928 Report Delayed

SPECIAL circumstances, it is stated in a prefatory note, have delayed the publication of the Annual Report on the Progress of Civil Aviation in 1928, which was issued towards the end of last week. Consequently certain brief references have been made in the Report to developments which have occurred during the present year, *i.e.*, outside the period covered by the Report. The general arrangement of the Report is similar to previous issues, and photographic illustrations of certain aircraft and other subjects are a welcome addition to the various air route maps, etc.

Chapter I deals with Civil Flying in general; Chapter II with Ground Organisation; Chapter III with Technical Development, and Chapter IV with Administration. In Chapter V are given, in the form of tables, a number of statistics of civil flying, while Chapter VI contains a great deal of information concerning the Dominions, India and the Colonies. Aviation in foreign countries is given a chapter to itself (VII).

Space does not permit of giving the statistics in full, but the following summaries may be of interest; During 1928 the number of aircraft flights made on regular services, in private and commercial special charter flights, etc., amounted to 5,866. The aircraft mileage was 1,011,000, and the number of passengers carried 27,659. The cargo carried amounted to 772·3 tons.

During the year the statistics relating to short pleasure flights, flights in connection with air photography, sky writing, etc., show that there were 48,910 aircraft flights, an aircraft mileage of 236,000 and 97,619 passengers carried. All these figures show a very substantial increase as compared with the corresponding figures for 1927.

Between Great Britain and the Continent, 3,120 flights were made by British machines, and 24,810 passengers carried. During the same period the number of flights made by foreign aircraft was as follows: Belgian, 610; French, 1,865; German, 897; Netherlands, 1,114. The number of passengers carried by foreign machines was: Belgian, 2,064; French, 8,562; German, 2,129; Netherlands, 5,611. The percentage of flights by British machines was 41, and the percentage of passengers carried in British machines was 57. In 1927 the passenger percentage was, curiously enough, exactly the same, but the British flights better, *i.e.*, 43 per cent. of the total.

The figures relating to the value of goods imported into and exported from Great Britain by air, during 1928, are as follows: Imports, £2,003,551; exports and re-exports, £981,138. The latter figure does not include the value of aeroplanes exported under their own power, which totalled £14,021. The corresponding values of bullion and gold and silver coin were: Imports, £353,211; exports and re-exports, £5,054,093.

The statistics relating to subsidised flights on the European services operated by Imperial Airways, Ltd., are interesting. During 1928, the number of aircraft miles flown was 793,365; horse-power miles, 784,142,380; passenger miles, 6,022,600; goods ton-miles, 184,289; passenger ton-miles, 537,732; total ton-miles, 722,021. The average load carried was 2,040 lbs. This compares with an average load carried in 1927 of 1,810 lbs., and reflects the utilisation of larger aircraft. No less interesting is the table (5) giving statistics relating to the efficiency of the European services of Imperial Airways. Out of a total number of 4,566 flights scheduled, 224 were cancelled, 4,342 flights were commenced, and 4,020 completed without interruption; 271 flights were completed after interruption, and 51 flights were interrupted and not completed; 88 per cent. of scheduled flights were completed without interruption, and 94 per cent. with or without interruption. Of flights commenced, 92·6 per cent. were completed without interruption, and 98·8 per cent. with or without interruption.

The table giving causes of involuntary landings on European services shows that out of the 4,342 flights commenced during 1928, in 174 (63 per cent.) the landing was caused by weather; 82 (29 per cent.) by mechanical failure; and miscellaneous reasons 22 (8 per cent.). The percentage of total flights commenced which were interrupted by all causes was 6 per cent.

On the Cairo-Basrah service, the statistics cover the period December 27, 1926, to December 31, 1928. From December 27, 1926, to December 31, 1927, the figures were: Aircraft miles, 104,297; passengers carried (by stages), 1,116; horse-power miles, 132,978,675; passenger miles, 267,640; goods ton-miles, 15,968; passenger ton-miles, 26,883; total ton-miles, 42,851. The average load was 920 lbs. For the period January 1 to December 31, 1928, the corresponding figures were: Aircraft miles, 117,935; passengers carried (by stages), 2,039; horse-power miles, 150,367,425; passenger miles, 453,605; goods ton-miles, 31,154; passenger ton-miles, 45,563; total ton-miles, 76,717. The average load during 1928 rose to 1,460 lbs.

Of the flights scheduled on this service, 91 per cent. were completed without interruption; 99 per cent. completed with or without interruption. Of flights commenced, 92 per cent. were completed without interruption, and 100 per cent. with or without interruption.

During the four years 1925-1928, 3,482,000 aircraft miles were flown, and there was no accident resulting in death or injury to any fare-paying passenger on British *regular* air services.

The statistics relating to the light aeroplane clubs show that on December 31, 1928, there were 13 of these clubs, with a total membership of 3,288, of whom 1,769 were flying members. The number of club members who, during the year, qualified for their "A" licence was 219, and the total number of club members so qualified at the end of 1928 was 434. Four club members qualified for their "B" licence during 1928, and the total number of club members with "B" licences at the end of 1928 was 40. Between them, the clubs made 34,448 aircraft flights, and flew for 12,201 aircraft hours.

Dominion and Foreign Statistics

The Report contains some very interesting statistics and other information concerning aviation in the Dominions and abroad, from which we quote a few. In *Australia*, the number of miles flown during 1928 was 421,894, and the number of passengers carried (by stages) was 3,077. Australian machines carried 129,202 lbs. of goods and 317,383 letters. It is somewhat disappointing to find that both the number of miles flown and the number of passengers carried were less than during 1927. Goods and letters, however, showed a substantial increase, especially goods.

For *Canada*, a summary of statistics for 1928 is as follows: Number of aircraft flights, 75,285; aircraft mileage, 2,728,414; number of passengers, 74,669; freight or express, 2,404,682 lbs.; mails, 316,631 lbs.; total number of square miles covered by aerial photography, 23,822. The figure for aerial photography does not include photography for topographical surveys by the Directorate of Civil Government Operations. During 1928, no less than 65,200 square miles were photographed.

By way of comparison, the following figures are of interest. They refer to the *regular* commercial air services of the principal states. The route-miles operated in 1928 by the various states were as follows: Great Britain, 2,215; Belgium (including Belgian Congo), 2,511; Denmark, 268; France, 12,570; Germany, 18,000; Holland, 1,900; Italy, 7,000; Poland, 1,360; Russia, 8,690; Sweden, 711; Switzerland, 1,143; United States of America, 10,932.

The number of miles flown by machines of the respective states were: Great Britain, 1,135,910; Belgium, not known; Denmark, 98,100; France, 4,534,156; Germany, 6,820,000; Holland, 760,000; Italy, 1,238,000; Poland, 660,373; Russia, 1,150,000; Sweden, 171,400; Switzerland, 330,600; United States, 5,585,224.

The number of passengers carried was: Great Britain, 29,300; Belgian, not known; Denmark, 1,602; France, 19,698; Germany, 113,645; Holland, 14,049; Italy, 15,590; Poland, 6,477; Russia, 7,000; Sweden, 4,697; Switzerland, 7,146; United States, not known.

Particulars are not published concerning the amount of goods carried by the machines of certain states. Those which are known are as follows, the figures being tons: Great Britain, 760; Denmark, 34·1; France, 1,138·1; Germany, 2,089·29; Holland, 582·56; Italy, 223·67; Poland, 207·23; Sweden, 82·6; Switzerland, 109·35.

Mails (tons) were carried as follows: Great Britain, 125·3; Denmark, 5·8; France, 128·3; Germany, 340·07; Holland, 39·1; Italy, 21·42; Poland, 32·17; Sweden, 15·4; Switzerland, 43·6; United States, 831·1. In the case of Russia, no distinction is made between goods and mails, and the total carried during 1928 was 143 tons.

Unsubsidised Flying

Owing to the fact that the Annual Report appears rather late this year, much of the information contained may have

the appearance of rather "stale" news. It is, however, something of an eye opener to learn from the report that Air Taxis, Ltd. (Mr. Hope's concern) flew, during the year ended August 1, 1929, no less than 64,000 miles during the course of special charter flying. The excellent work done by the two air survey firms, the Aircraft Operating Company, and the Air Survey Company, is dealt with at some length in the Report. Maps are published showing the areas surveyed by photography, which indicate that the Air Survey Company surveyed the following districts, the figures representing square miles: Bengal, 2,950; Bihar and Orissa, 375; United Provinces, 2,872; Punjab, 550; Federated Malay States, 800; Burma, 16,400; Borneo, 3,700.

The Aircraft Operating Company worked mostly in Northern Rhodesia, but also in the Middle East and in South America. The areas, in square miles, surveyed in Africa were as follows: Rhodesian Congo Border reconnaissance, 30,000; Benguela Railway reconnaissance, 180; Northern Rhodesia Government survey, 12,000; International boundary survey, 1,000; Zambesi River survey, 1,000; Kabompo River survey, 300; Lungwebungu River survey, 120; town-planning surveys, 300; Wankie Railway survey, 100. To this truly imposing work must be added photography of an area of 1,070 square miles for the Iraq Government. The South American contract, of which no figures are available as regards area, was for a large-scale survey of Rio de Janeiro and the surrounding districts. Some idea of the magnitude of the task, which is expected to occupy three years, may be formed when it is pointed out that the town of Rio is being mapped on a scale of approximately 63 in. to the mile, with the suburbs and surrounding country on a smaller scale.

Ground Organisation

In the section of the report which deals with ground organisation it is pointed out that during 1928 continued progress was made in the improvement on the regular routes. It is somewhat disappointing to be informed, however, that no satisfactory advance has been made in the leader cable experiments, and that consequently the question of the installation of this apparatus at Croydon is still in abeyance.

On the Cairo-Karachi route, the report states, it has been decided to arrange for night flying between Baghdad and Basrah, and a self-contained mobile and rotating floodlight is to be installed both at Baghdad and Basrah. No mention is, however, made of the date by which the arrangements are expected to be ready for operation.

Progress has been made with wireless communication, and the report states that the use of short waves is under international investigation. The British meteor messages have been experimentally transmitted on a wave-length of 32 m. in addition to the normal of 1,260 m. The route traffic service on 1,400 m. will shortly be duplicated by an experimental service on 55 m. Experimental transmissions from air to ground have been carried out on 45·5 m.

Licences and Certificates

A very gratifying increase in licences and certificates issued during 1928 is recorded. Pilots' licences have increased from 244 to 483; navigators from 12 to 14; ground engineers from 69 to 114. 294 registration certificates for heavier-than-air craft were issued as against 104, and 463 certificates of airworthiness as against 155. Aerodrome licences increased from 146 to 206.

Accidents

During 1928 there were altogether 29 accidents to which Air Navigation (Investigation of Accidents) Regulations were applicable. Of these, 12 resulted in loss of life, six caused severe but not fatal injuries to persons, and 11 had no serious consequences beyond structural damage to the aircraft. Half the number of major accidents involved machines belonging to light aeroplane clubs. "It is satisfactory to record," the report continues, "that for the fourth successive year no passenger travelling in a British aircraft on the scheduled services was injured."

The accidents are classified in the report according to the various flying organisations as follows:—

	Fatal.	Involving serious injury.	Minor.	Total.
Regular air transport ..	1*	—	—	1
Other flying for hire ..	1*	3	4†	8
Light 'plane clubs ..	6	2	1	9
Private flying	1	1	4‡	6
Schools	1	—	2	3
Air racing	1	—	—	1
Constructors' test flights	—	—	1	1
	11	6	12	29

* Test flights.

† One of these was during an exhibition flight, one during a flight transferring joy-riding headquarters from one point to another, and one during a test flight.

‡ One case involved the death of a third party on the ground.

Long-Distance Flights

Although they are now old history, it is interesting to find that the report gives brief particulars of the more meritorious long-distance flights made during 1928. Of those made by foreign machines, mention is made of the flight from Ireland to Labrador in a Junkers machine. Of British flights mention is made of the following: Hinkler's flight from London to Australia in an Avro Avian (Cirrus); Sir Alan Cobham's flight round Africa in a Short "Singapore" (Condors); Lady Bailey's flight, London–Cape Town-London in a Moth (Cirrus); Mr. Barnard's flight from Karachi to London in a Fokker (Jupiter); Lieut. Murdoch's flight from Lympne to Cape Town in an Avro Avian (Cirrus); Lieut. Bentley's flights from Cape Town to London and from London to Pretoria in a Moth (Cirrus); Kingsford Smith's flight from California to Australia in a Fokker (Whirlwinds).

Technical Development

The section of the report which deals with technical development contains data relating to the following machines: the Short "Calcutta" (three Jupiters); the Vickers "Vellore" (Jupiter). Concerning the "Vellore" the report states: "It is noteworthy that the useful load of 4,950 lbs. carried was greater than the weight of the aircraft." No explanation is, however, given of the reasons why Imperial Airways failed to make use of such an efficient aircraft.

Particulars of two engines are given: the de Havilland "Gipsy" and the A.D.C. "Hermes."

In addition to the above, photographs are given of the Armstrong Whitworth "Argosy," of the de Havilland "Hercules," of the Vickers "Vellore," and of the Westland IV (three Hermes).

Lighting Canadian Air Mail Routes

THE Department of National Defence at Ottawa has let contracts to the Canadian General Electric Company and the Highway Lighthouse Company for the installation of lighting facilities along air mail routes in Western Ontario and the Prairie Provinces. As the result of this action by the Department, night flying operations and air mail services in Western Canada will receive a considerable stimulus. The Canadian General Electric Company will instal five electric revolving airway beacons between Winnipeg and Hamilton, Ontario, and the Highway Lighthouse Company will erect eleven acetylene gas beacons between the same points. Both companies have contracted to perform a similar service on the airway between Winnipeg and Calgary, *via* Regina, Moose Jaw and Medicine Hat, the General Electric supplying and installing 14 electric airway beacons mounted on 50-ft. towers, and the Highway Lighthouse Company 47 acetylene gas airway beacons. The airway beacons are to be placed at intervals of approximately 10 miles between the principal airports. The electric revolving type are to be placed on the aerodromes at Windsor, London, Brantford and Hamilton. The revolving searchlight types have a range of visibility of fully 30 miles in clear weather and serve to guide the pilot to his landing place. An electric beacon has also been purchased for installation at Tilbury, Ontario, to mark a change of course on the route. The gas beacons are of a smaller type, to be placed on the airways between the main beacons. The boundary, obstruction and flood lights required to complete the aerodrome lighting are supplied by lessees or owners of the airports. The Department of National Defence, however, assists in the provision of these by making a grant of 50 per cent. of the capital cost of such equipment. Commenting on the Prairie lighting, a statement from the Department announces that 61 airway beacons in all will be installed as well as two radio beacons, one in Regina, Sask., and the other at Forrest, Manitoba.

AN ANCIENT RITE FOR A NEW PROFESSION

ON Saturday last, October 19, air pilotage and navigation formally became an honourable and worthy profession. This does not mean to imply that it was not so before, but with the formation of its own Guild it, to a certain extent, assumes a status which hithertofore it did not have.

The occasion was one of very great historic interest, because there can naturally never be another similar occasion, and it is certain that all those who took part in the installation of the Master, Officers and Members of the Court were fully imbued with its solemnity.

The Guild of Air Pilots and Air Navigators of the British Empire, to give it its full name, now has the following officers : *The Master*, Air Vice-Marshal Sir Sefton Brancker ; *The Deputy Master*, Sqdn.-Ldr. E. L. Johnston ; *The Wardens*, A. S. Wilcockson, O. P. Jones, Capt. A. G. Lamplugh, Capt. N. Macmillan ; *The Members of the Court*, F. Tymms, Capt. W. L. Hope, C. R. McMullin, L. A. Walters, F. Dismore, F./O. H. D. Davis, Flt./Lt. G. H. Allison, F./O. H. J. Horsey, Capt. J. B. Cordes, Lt.-Cdr. N. G. Atherstone, F./O. E. A. Jones, C. A. Pike. *Honorary Members of the Court*, Col. The Master of Sempill, Sir A. Whitten-Brown, The Rev. P. D. Robins. *The Chaplain*, The Rev. P. D. Robins. *The Clerk*, L. A. Wingfield.

The installation ceremony was extremely impressive, and portions are reproduced here. After the entrance of the Master, Deputy Master and Wardens, the Clerk and Chaplain the latter gave an opening prayer, and then the Clerk addressed the newly-elected Master with the following adjuration :—

" Air Vice-Marshal Sir Sefton Brancker, since time immemorial all sections of Society have found it to their mutual benefit to combine themselves into Orders, Guilds and Societies, for the protection and improvement of their common interests.

" Such bodies have been founded for the preservation of the finest examples of Chivalry, others for the preservation of Ancient Secrets, and in more recent times for the purpose of fostering honourable professional practice.

" This Guild of Air Pilots and Air Navigators of the British Empire has been founded on the highest principles to promote the consideration and discussion of all questions affecting its members and to protect and advance the interests of Commercial Aviation.

" It will constitute a body of experienced Airmen who will be able to act as Members of or give evidence before Royal Commissions and the like, and it will consider and promote improvements in the laws affecting Commercial Aviation as well as undertake to improve and elevate the technical knowledge of its members and to promote honourable practice in the profession of Commercial Aviation.

" Unlike the bodies which represent other professions long established, this Guild represents a body of men who are pioneers in a comparatively new profession which has yet to establish its traditions and precedents.

" We are not, however, without precept, and our endeavour must be to emulate the example of unselfish devotion to the progress of aviation set by those who have made the supreme sacrifice for the benefit of future generations.

It was from the hazards accepted by them that the lessons were learnt upon which the foundations of security have been laid for the benefit of mankind.

" The limits of flight can only be explored by a union of supreme skill and nerve ; men have perished in no nobler cause than this, by which the human race is being drawn together in closer fellowship. But courage, daring and endurance alone are not enough. It is only by soundly organised scientific attack, in principle and practice, combined with a noble team work of those engaged in the business of Commercial aviation and the fostering of brilliant airmanship, that victory will be achieved and commercial aviation established throughout the British Empire. By the zealous practice of these commendable principles this Guild hopes to establish its members meritoriously in the eyes of men.

" With these objects before us, it is essential that our Master must be prepared to support with vigour the development of Commercial Aviation within the Empire, and to carry out with dignity the duties of his office so that his judgments will be accepted as precedents to future members of this Guild."

Thereafter the Master, followed by the Officers, were sworn in with a particularly solemn form of promise, which adjured them to honour the King and to conform to the laws and tenets of the Guild, and finally the ceremony closed by the Master saying :—

" Gentlemen, let justice and prudence be the guide of all your actions and let your obedience be proved by a strict observance of our laws and regulations, by your regular attendance at our meetings, and by a ready acquiescence in all votes and resolutions passed by a majority of the members."

And the Chaplain delivered the following prayer :—

" Eternal Creator, send us forth with the light of hope in our eyes, and the fire of courage in our hearts, and help us to be masters of ourselves that we might be the servants of our fellow men."

After the ceremony a dinner to celebrate the inauguration was held at the Cecil Hotel. The Master proposed the Loyal Toast, and then Mr. Frederick Montague, the Under-Secretary of State for Air, proposed the Guild of Air Pilots and Air Navigators of the British Empire. He said that the formation of such a Guild was long overdue as, in view of the growing importance of aviation, it was highly desirable that those connected with it should have a proper organisation from which their correct status might be established. He had, he said, become a firm convert to aviation in the last few months as previously he knew very little about flying ; but now, since he had taken every available opportunity to do so, he had developed a profound belief in its future possibilities. What they wanted to do, he said, was to develop air sense in all people, and this was what this Guild would go a long way toward doing. The Master, in replying, said that it was the first time he had been called worshipful, and he hoped that when he was handed down to posterity as the first Worshipful Master they would not forget that at the dinner he was supported by a lovable hostess in the person of Lady Cobham.

The main credit for the formation of this Guild, he said, should be given to Sqdn.-Ldr. Johnston and Mr. L. Wingfield, who had worked exceedingly hard during the last 12 months to bring it into being. One of the best apostles of peace and aviation was our Prime Minister, and the International Commission for Air Navigation had also done a very great deal toward the same objects. The Commission was, he said, a body that they might well emulate in all their dealings, as, although it was composed of some 20 nations, they were more like a family party, and had never failed to come to amicable agreements on all major points. That sort of spirit was the one that was going to help things, and was what they wanted in this Guild, as the spirit of camaraderie which today existed between the pilots of all nations must be fostered in the cause of world peace and of commercial aviation.

Mr. Wingfield then proposed the toast of the Guest and apologised for the difference between this Guild's hospitality and that of the older Guilds, but hoped that one day they would also be rich and able to entertain on similar lines.

Col. Edwards replied and enlarged on the fact that although pilots were not supermen they had to attain an extremely high standard of proficiency, and as for first-class navigators—well, words failed him in his admiration for them.

The following were present at the dinner :—

Com. Atherston, Fl./O. Armstrong, A.F.C., H. Adams, Mrs. Adams, Fl./Lt. G. Allison, Mrs. Allison, R. Brenard, Alan Butler, Mrs. Butler, Air Vice-Marshal Sir Sefton Brancker, K.C.B., A.F.C., A. T. Butler, Mrs. Butler, Mrs. T. Bell, Miss Bolton, Capt. H. S. Broad, A.F.C., Fl./Lt. G. Birkett, Mrs. Birkett, Sir A. Whitten Brown, K.B.E., Lady Brown, Fl./O. Brailli, T. Bell, Fl./Lt. Bulman, M.C., A.F.C., M. Bramson, Mrs. Bramson, Capt. Baker, C. G. Colebrook, Sir Alan Cobham, K.B.E., A.F.C., Lady Cobham, Lt.-Com. Colson, Fl./O. Downer, Col. Ivo Edwards, C.M.G., Mrs. Edwards, A. C. Gray, C. G. Gray, Mrs. Gray, G. A. Giblett, T. T. Griffith, Mrs. Griffith, Mrs. Hope, Fl./O. H. T. Horsey, Mrs. Horsey, Sq./Lr. Hinckler, A.F.C., D.S.M., Capt. O. P. Jones, Mrs. Jones, Sq./Ldr. Johnston, O.B.E., A.F.C., Mrs. Johnston, C. Jeffs, E. H. Lawford, A.F.C., Capt. Lamplugh, C. R. McMullen, Frederick Montague, M.P., Mrs. Montague, Capt. N. MacMillan, Mrs. MacMillan, R. F. Matthews, L. F. Nicholson, Mrs. Nicholson, G. Olley, M.M., Mrs. Olley, Com. H. Perrin, Mrs. Pike, Mrs. C. A. Pike, T. Pike, Mrs. Pike, P. Phillips, D.F.C., S.M., F. E. Rosher, Fl./Lt. Rose, Rev. P. Donald Robins, A.F.C., Mrs. Robins, H. Ross, C.B.E., Fl./Lt. Smith, E.F., Mrs. Smith, Col. the Master of Sempill, A.F.C., The Hon. Mrs. Forbes Sempill, H. G. Travers, F. Tymms, M.C., Mrs. Tymms, Sir Vyell Vyvyan, Lady Vyvyan, Major Vernon, Mrs. Vernon, L. A. Wingfield, M.C., D.F.C., Fl./Lt. Woodhead, Mrs. Woodhead, C. A. Wingfield, Mrs. L. Wingfield, A. S. Wilcockson, Mrs. Wilcockson, Sq. L.dr. Wright, Mrs. Wright, F./O. A. B. Youell, Mrs. Youell.

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A Cabin Aeroplane Wanted for Switzerland

THE British Legation at Berne reports that a local air transport company propose to purchase a cabin aeroplane accommodating four to five passengers, with a useful range of 450 to 500 miles and a ceiling of 4,500 m. Firms desirous of offering British built aircraft can obtain further particulars upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Ref. No. AX.8688 should be quoted.

THE ENGLAND–INDIAN AIR MAIL

NOW that the Direct Indian Air Service has been in operation for six months, it may be of interest to give some particulars of the results, which have been issued by the General Post Office.

The service by Imperial Airways to India was inaugurated on March 30, 1929, from Croydon, and the first return flight commenced from Karachi on April 7. The route taken is by air from Croydon via Paris to Bâle, thence by train to Genoa; subsequently the air route followed is Genoa-Athens-Tobruk (Libya)-Alexandria-Gaza-Baghdad-Basra-Jask (Persia)-Gwadar-Karachi. The eastbound aeroplanes leave Croydon every Saturday morning, and the westbound service starts from Karachi every Sunday morning; the actual time of transit over the whole route is 7½ days.

The service was thrown open at the start for the carriage of the air mails of every country on the actual route; and, after a few weeks' experimental period, it was made available (in June) to the mails of every country in the Postal Union. Austria, Belgium, Canada, Ceylon, Czecho-Slovakia, Egypt, France, Germany, Greece, Holland, India, Iraq, Irish Free State, Latvia, Palestine, Persia, Sweden, and the United States of America are either using, or have expressed their intention of using, the service. The list is not exhaustive.

The traffic to and from India has been increasing steadily week by week. From an average of about 300 lbs., in either direction (India only), the average weekly weight is now over 550 lbs., representing nearly 5 per cent. of the total letter mail outward, and over 5 per cent. inward. (It should be mentioned that the weight of the ordinary mail outward is greater than the inward.) The average weekly weight of the whole mail despatched from London is nearly 750 lbs., and of the mail received about the same, or 1,500 lbs., a week in all. This does not include mail loaded at intermediate places, of which complete figures are not yet available.

During the first six months' working of the service 14,656 lbs. of mail have been carried from London to various destinations, and 17,529 lbs. of mail have reached London; or a total weight in both directions of 32,185 lbs. The corresponding figures for India alone are 11,893 lbs. outward and 11,436 inward. According to existing information there is no regular long-distance service operated from Europe whose traffic figures can compare with these.

The service has been operated from the start with remarkable regularity. Outward, apart from the tragic Jask disaster, there have only been two late arrivals in India (owing to floods and to sand storms respectively) in 26 flights; and homeward there have been three late arrivals (two owing to missing the train connection at Genoa and one owing to sand storms).

The normal closing time for the air mail to India during the summer flying period was 7 a.m. on Saturdays at the General Post Office, London; but arrangements were introduced in September for a late posting (without special charge) at Charles Street Branch Office, near Charing Cross, up to 9.25 a.m.

As from October 12, the hour of departure from Croydon was put back to about 8.30 a.m., owing to the change to winter time and the need for leaving a wider margin for the journey to Bâle, where the train connection to Genoa must be made. The latest time of posting will now, therefore, be 6 a.m. on Saturdays at the General Post Office, and the late posting at Charles Street will be suspended until the spring. The latest time of posting in the provinces varies, but information on the subject can be obtained at local Post Offices.

The fees charged to the public, 6*d.* to India and Persia, 4½*d.* to Iraq, and 2½*d.* to Egypt and Palestine per ½ oz. in each case, are very appreciably lower than the fees charged for comparable services conducted by other countries.

The only serious difficulty which has been experienced is with letters which are despatched by the public with insufficient postage to cover the air fee. The Post Office is not permitted by the International Air Mail Agreement (to which Great Britain is a party) to send by air letters which do not bear the minimum air fee and, even if this were possible, a large number of the letters would inevitably be refused owing to the amount of the surcharge, which averages at least 1*s.* per letter. Where the name of the sender is known, effort is made whenever practicable, to inform him of the under-payment of his letter and to give him an opportunity of affixing stamps for the deficiency before the mail leaves. But in many cases the sender is not known or the error is considerable, and there is no course open but to send the letter by ordinary mail with consequent heavy delay. Most of the errors appear to be due to an impression that a 6*d.* air fee will cover any weight, instead of being the fee for each ½ oz. The public are therefore asked once more to note, in using the Indian Air Mail, that letters to India must bear stamps to cover the ordinary postage plus the air fee at 6*d.* per ½ oz. or fraction thereof. The air fee to Egypt and Palestine is 2½*d.* per ½ oz., plus postage, and to Iraq and Persia, 4½*d.* per ½ oz. plus postage. Ordinary postage to Egypt, Palestine and India is 1½*d.* for the first ounce, and 1*d.* for each succeeding ounce. To Iraq the rate is 2½*d.* for 1 oz. and 1½*d.* for each further ounce.

R. 101. A SUCCESSFUL LONG FLIGHT

ON Thursday last, October 17, R.101 was given a further mooring up trial. She was remoored in a wind of 25-30 m.p.h., and the whole operation went with perfect smoothness throughout. Later on the same day, in the evening, a line squall, which had been predicted, struck the ship. The wind, which had been at about 15 m.p.h., rose in 10 minutes to 25 m.p.h. and changed its direction 45° and at the same time the temperature dropped 2°; however this combination of rapidly changing factors made no great difference to the ship, or occasioned any trouble whatever.

The following morning the ship left Cardington at 8 a.m. She had on board 50 people, amongst whom were Lord Thomson and his private secretary, Maj. Bullock, Mr. S. Reynolds, Sqdr.-Ldr. B. Colmore, Lieut.-Col. C. Richmond, Wing-Commdr. Cave-Brown-Cave, Sqdr.-Ldr. Rope, and Lieut.-Commdr. Pressey, of the R.C.A.F., who is over here with four other ranks to learn the routine of mooring up at the mast so that he will be able to take charge at the St. Hubert airport when R.100 makes her trip to Canada. Maj. Scott was in command for the flight, but the ship was generally under the direction of Flight-Lieut. Irwin, with Sqdn.-Ldr. Johnston as navigator, Lieut.-Commdr. Atherstone first officer, and Flying Officer Staff second officer.

Communications were received frequently throughout the trip. At 9.15 she reported over Northampton, at 10.5 over Rugby, at 10.15 over Coventry, 10.40 Birmingham, and at noon over Nottingham.

When approaching Newark, Lord Thomson sent out a message that they were making a ground speed of 60 m.p.h. with only 50 per cent. of the available power being used. He said that the conditions were ideal and that the trip was comfortable, smooth, and restful. She was reported later over Derby and Leicester, and at 2.15 p.m. was again at Cardington.

There was some little delay while waiting for cooler and quieter conditions and she was finally moored up at 6 p.m. This having to wait before mooring up has caused some adverse comments to be published, but, as Lord Thomson pointed out, the crew have yet to shake down and learn how to handle the ship under all conditions, and until such time it is obviously best not to take any undue risks; he said he remembered the *Majestic* arriving off the Ambrose Light at 6 a.m. and not docking till 5.34 p.m.

The subsequent technical report on the flight was in every way satisfactory. Even at higher speeds under bumpy conditions it was not necessary to relieve the men at the control by utilising the Servo-motor gear.

As a meteorological report indicated the possibility of strong gusty winds on Wednesday, and there was a certain amount of work to be carried out on the starting engines in preparation for the full-speed trials, it was decided on Tuesday evening to move the ship back into the hanger. This was done by searchlight, and she left the mast at 7.5 p.m. and was safely housed by 7.50.

FORUM CLUB AVIATION GROUP

An Inaugural Banquet

SO successful has been the creation of an Aviation Group in the Forum Club, suggested only a few months ago, that it was decided to hold an inaugural dinner last Monday evening at the club, when Lady Bailey, the first president of the group, presided. This movement has proved so popular that, although the dining room of the club was packed to its utmost seating capacity, there still remained a number of would-be participants who were unable to be accommodated, a good omen for its further rapid growth. Guests of honour upon the occasion included Lord Thomson, the Minister for Air; Capt. C. D. Barnard; Mr. and Mrs. R. Bentley; Earl and Countess de la Warr; Sqdn.-Ldr. A. G. Jones-Williams; Sqdn.-Ldr. A. Orlebar and Mrs. Orlebar; Col. The Master of Sempill; and Lieut.-Col. N. G. Thwaites.

Lady Bailey, in referring to the founding of the group, said that this had only been initiated in June last, and already they numbered 106 adherents. In addition to their support of the group, members became automatically members of the Air League, as a portion of each subscription was earmarked for that purpose. By this means they had been enabled to pass over quite a nice little sum to the Air League, thereby helping to strengthen the great cause for which it was founded. Altogether, the group members had many advantages and opportunities of direct association with aviation. By way of instance, she had to thank Mrs. G. de Havilland, one of their members, who had recently entertained them at Stag Lane aerodrome, where a number were enabled to indulge in flying. On behalf of the group, Lady Bailey continued, she was glad to tender a hearty welcome to their chief guest that evening, Lord Thomson, and to those other guests who had honoured them by their presence.

Lord Thomson, in response, thought that he might have been passed over for reply, and preferably, several of those present called upon for personal descriptions of their remarkable flights, starting with a recital from their president that evening about her little jaunt, which terminated about 48 hrs. ago, with Lady Bailey more or less standing on her head—her head being some six feet from the ground in a soft field in Germany. From this position she was rescued by a burly Teuton, down whose back she scrambled. The aeroplane still remained *in situ*.

Lord Thomson then, referring to airships, said he noted there was no member of the circle that was a lighter-than-air enthusiast. He would warn the heavier-than-air people that if the results of their present experiences with R.101 proved half as successful as they promised to be, the non-distant future would see a form of travel and of conveyance with which no other method of travel which he had experienced could compare. Then followed his personal feelings during his recent voyaging in R.101, the comfort, luxury and enjoyment of which Lord Thomson painted in very fascinating colours. Altogether, he said, it was an astonishing experience. In a few years' time he believed hundreds of thousands of people would be enjoying these same delightful sensations. Speaking of certain criticisms, he said that had Britain desired to copy other people's productions they could have given them six or more airships a year or more ago. But they preferred to follow their own lines. Until the "Graf Zeppelin" took the air no airship had been built purely for passenger and commercial purposes. All had been built for war purposes. In the design of R.101 and R.100 the dominating consideration was to secure safety first, not as in the war vessels, achievement primarily. In this was included the installation of heavy-oil engines, thereby eliminating the dreaded risk of using petrol. For that experiment a great deal had been sacrificed, but the short tests so far carried out had been justified by the results. R.101 was not a copy of the Zeppelin; it was purely British. He did not claim it to be the fastest in the world, but it was, he believed, the safest and strongest so far built. Our imaginations, he thought, must be struck by the performances achieved—moreover, the possibilities of world expansion was forecast by the mooring masts already in being, and the number already contemplated at various important world airports. At present, they were experimenting with a very big thing, with a form of travel and communication of incalculable significance to the British Empire. He did not believe the money which he induced the Chancellor of the Exchequer five years ago to spend would be wasted.

Lord Thomson then paid a great pæan of praise to Col. Richmond, the designer, whose every calculation had been justified in practice. He also followed with admiration for Capt. Scott and his skill in navigating the great ship, and the others associated with his command, especially commending the crew, which consisted of three watches, two of which were aboard at a time, and the only grouse he had heard came from the third crew which had been left behind. R.101, he said, was then back in her shed for some minor repairs, and would be out again in a few days' time. She would then visit various parts of England prior to her flight to India and back. In conclusion, he hoped this aviation group would succeed in its desire to take part in the progress of aviation, and he hoped that to their next committee would be added one of their members to represent lighter-than-air.

Sqdn.-Ldr. Orlebar, in responding, gave a graphic account of his feelings under the speed conditions called for in high-speed flying. Speed, he said, was—well, just like flying. He then enlarged upon the possibilities which *might* have occurred during the Schneider Trophy contest, and their great luck in experiencing such wonderful weather conditions.

Mr. Bentley, who followed, modestly recited a few points in regard to his African experiences, and passed a deserving compliment to the support throughout of his wife.

Capt. Barnard thought Lord Thomson was pessimistic regarding flying. Heavier-than-air flying was quite an easy matter—at least, *he* thought so. He was, he said, trying to persuade the Duchess of Bedford to fly to Cape Town and back in 14 days, a journey which would surpass her previous great effort.

Mrs. Forbes Sempill, in proposing the toast of "The Guests," took the opportunity of offering their homage to members of the Service for wonderful work, carried out without ostentation in the ordinary routine of their duty.

Col. Thwaites, in returning thanks, paid his tribute to the Aviation Group of the club, formed only a few months back, at the inspiration, he believed, of Lady Elibank, and so splendidly carried through to its present successful stage by Miss Alice Williams. After referring to the earnest and unselfish work carried out by Gen. Groves in connection with the Air League, he said aviation was fortunate in having had such helpful support in a practical form from the ladies, and he thanked the Group for the delightful evening they had afforded himself and his fellow guests.

The Master of Sempill, in proposing the toast of "The President," which was received with acclamation, said he felt that the example set by the Forum Club in forming this group would surely be followed by other clubs, but he foresaw one great difficulty with them in being able to find so eminent a president as the Forum Club had secured.

Lady Bailey briefly and suitably replied.




PRAGUE AERODROME IN 1928.

THE Public Service Technical Reports dealing with the development of the passenger, mail and baggage traffic passing through Prague Aerodrome in 1928 gives the total number of flights made to the nearest transport aerodromes as representing a distance of 1,234,250 km. The flights numbered 5,091, passengers carried 14,336, mails 17,970 kg., and freight 579,420 kg.

Since 1921 air transport has rapidly increased, so that it has been necessary steadily to increase the number of machines in operation. This year the International C.I.D.N.A. concern will introduce modern monoplanes with 420-h.p. Jupiter motors and accommodation for seven passengers, and capable of a speed of 180 km. an hour, as well as machines with Titan motors and accommodation for four passengers, capable of 170 km. an hour. In addition to these the company has ordered 10 Fokker machines, including triple-motor ones for the Paris-Prague service.

The various air lines passing through Prague, and conducted by different companies, are:—1. Prague-Brno-Bratislava-Kosice; 2. Prague-Marianske-Lazne (Marienbad); 3. Vienna-Prague-Berlin; 4. Bratislava-Prague-Munich; 5. Prague-Bremen; 6. Prague-Rotterdam; 7. Prague-Paris and Prague-Warsaw.

The Bratislava to Kosice service will this year be extended to Uzhorod

THE ROYAL AIR FORCE

London Gazette, October 15, 1929.

General Duties Branch

Air Commodore W. G. S. Mitchell, C.B.E., D.S.O., M.C., A.F.C., is appointed Director of Training, Air Ministry (Oct. 4). D. H. F. Barnett is granted a permanent commn. as Pilot Officer with effect from Oct. 5, and with seny. of Oct. 5, 1928; Flight-Lt. J. C. E. A. Johnson is granted a permanent commn. in this rank (Oct. 1); Major V. M. Kenny-Leveck, M.B.E. (R.A.R.O.), is granted a short service commn. as Flight-Lt. (Hon. Squadron Leader) for three years on active list (Sept. 30); C. I. Semphill, M.M., is granted a short service commn. as Flying Officer for three years on active list (Sept. 30). The following Lieuts. are granted temporary commns. as Flying Officers on being seconded for duty with R.A.F. (Oct. 1):—A. O. Simpson (R.A.); E. O. Wanliss (E. Lancs. Regt.); E. A. Airy (The Buffs).

The following are re-attached to R.A.F. as Flying Officers with seny. of June 16, 1924:—Lt.-Comdr. I. R. Grant, R.N. (Sept. 29); Lt. H. Ditton, R.N. (Oct. 7). Flying Officer A. R. Perry is placed on retired list on account of ill-health (July 6); Capt. J. M. Fuller, R.M., Flying Officer, R.A.F., ceases to be attached to R.A.F. on return to naval duty (Oct. 12); the short service commn. of Pilot Officer on probation A. R. MacKewn is terminated on cessation of duty (Oct. 16).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

H. G. Watkins is granted a commn. in Class A.A. (ii) as Pilot Officer on probation (Sept. 30); Pilot Officer on probation A. D. Moore is transferred from Class A.A. (ii.) to Class C (Jan. 12); Flying Officer G. F. E. Harrison relinquishes his commn. on completion of service (Feb. 4); Flying Officer L. R. Mizen relinquishes his commn. on appointment to a commn. in the Indian Army (Sept. 20); Flying Officer D. H. F. Barnett relinquishes his commn. on appointment to a permanent commn. in R.A.F. (Oct. 5).

AUXILIARY AIR FORCE

Accountant Branch

No. 600 CITY OF LONDON (BOMBER) SQUADRON.—The following to be Pilot Officer:—R. Hiscox (Aug. 3).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captains: F. E. T. Hewlett, D.S.O., O.B.E., to R.A.F. Training Base, Leuchars, to command, 7.9.29. R. J. Bone, C.B.E., D.S.O., to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 18.8.29.

Wing Commanders: R. G. D. Small, to H.Q. Fighting Area, Uxbridge, for Air Staff duties; 18.9.29. W. B. Callaway, A.F.C., to H.M.S. *Furious*, for duty as Senior Air Force Officer; 7.9.29. F. W. Stent, M.C., to H.Q., Air Defence of Gt. Britain., Uxbridge, for Air Staff duties; 7.10.29.

Squadron Leaders: W. H. Dunn, D.S.O., to H.M.S. *Vindictive*; 26.8.29. H. H. James, O.B.E., to R.A.F. Depot, Uxbridge; 31.8.29. H. S. Scroggs, to R.A.F. College, Cranwell; 3.9.29. D. Iron, O.B.E., to R.A.F. Base, Gosport; 23.9.29. R. F. S. Leslie, D.S.C., D.F.C., A.F.C., to Home Communication Flight, Hendon; 16.9.29. J. S. T. Fall, D.S.C., A.F.C., to Superintendent of R.A.F. Reserve, Hendon; 26.9.29. T. P. Y. Moore, to H.Q., Fighting Area, Uxbridge; 29.5.29. L. T. Keeble, to R.A.F. Depot, Uxbridge; 17.8.29.

Flight Lieutenants: R. C. Savery, D.F.C., to R.A.F. Depot, Uxbridge; 26.9.29. G. Y. Tyrrell, M.C., to Hqrs., Wessex Bombing Area, Andover; 16.9.29. F. R. Wynne, M.B.E., to School of Army Co-operation, Old Sarum; 23.9.29. J. I. T. Jones, D.S.O., M.C., D.F.C., M.M., to Experimental Section, Royal Aircraft Estab., S. Farnborough; 18.9.29. A. King-Lewis, to Coastal Defence Co-operation Flight, Eastchurch; 24.9.29. H. E. Forrow, to No. 12 Sqdn., Andover; 13.9.29. F. K. Damant, D.F.C., to No. 5 Flying Training Sch., Sealand; 27.9.29. H. S. Broughall, M.C., D.F.C., to No. 22 Sqdn., Martlesham Heath; 18.9.29. C. T. Walkington, to No. 43 Sqdn., Tangmere; 29.8.29. E. D. H. Davies, to School of Naval Co-operation, Lee-on-Solent; 14.9.29. F. W. Long, to Marine Aircraft Experimental Estab., Felixstowe; 18.9.29. G. A. R. Muschamp, to No. 10 Sqdn., Upper Heyford; 3.9.29. T. S. Horry, D.F.C., A.F.C., to No. 22 Sdn., Martlesham Heath; 1.10.29. J. M. Glaisher, D.F.C., to No. 56 Sqdn., North Weald; 1.10.29. W. Badley, to No. 1 Flying Training Sch., Netheravon; 7.10.29. F. G. Cator, to Armament and Gunnery Sch., Eastchurch; 24.9.29. B. T. Hood, to No. 9 Sqdn., Manston; 1.10.29., C. J. Collingwood, to No. 23 Group H.Q., Grantham; 2.9.29. P. J. R. King, to Cambridge University Air Sqdn.; 8.10.29. H. D. O'Neill, A.F.C., to No. 100 Sqdn., Bicester; 8.10.29. G. A. Simons, to R.A.F. Depot, Uxbridge; 6.7.29.

Flying Officers: J. McGuinness, to No. 13 Sqdn., Netheravon; 8.10.29. J. H. Lindell, to R.A.F. Depot, Uxbridge; 1.10.29. C. A. Bell, to Cambridge University Air Sqdn.; 8.10.29. R. O. O. Taylor, to No. 33 Sqdn., Eastchurch; 23.9.29. A. L. T. Naish, to Armament and Gunnery Sch., Eastchurch; 3.10.29. V. Harris, to No. 99 Sqdn., Upper Heyford; 11.10.29. C. H. A. Colman, to Armament and Gunnery Sch., Eastchurch; 17.9.29. J. E. Allen, to No. 15 Sqdn., Martlesham Heath; 3.10.29. C. C. Edwards, to No. 41 Sqdn., Northolt; 6.10.29. W. J. P. Sloan, to No. 33 Sqdn., Eastchurch; 3.10.29. E. J. Ellis, to R.A.F. Depot, Uxbridge; 31.8.29. V. J. Sofiano, to R.A.F. Depot, Uxbridge; 8.9.29. E. A. Airey, A. O. Simpson, and E. O. Wanliss, all to No. 5 Flying Training Sch., Sealand, on appointment to Temp. Commns., 1.10.29.

Flying Officers: J. H. Sender, to No. 5 Flying Training Sch., Sealand; 25.9.29. D. A. Boyle, to No. 601 Sqdn., Hendon; 5.10.29. F. J. P. Dewhurst, to No. 16 Sqdn., Old Sarum; 3.9.29. A. J. W. Geddes, to No. 4 Sqdn., S. Farnborough; 3.9.29. M. Brunton, to No. 25 Sqdn., Hawkinge; 17.9.29. A. V. Harvey, to No. 602 Sqdn., Glasgow; 13.9.29. E. A. T. Murray, to No. 15 Sqdn., Martlesham Heath; 30.9.29. P. Hill, to No. 58 Sqdn., Worthy Down; 16.9.29. R. J. A. Ford, to No. 15 Sqdn., Martlesham Heath; 25.9.29.

Pilot Officers: J. D. Roden, to R.A.F. Depot, Uxbridge; 3.9.29. R. J. T. Barrett, to No. 43 Sqdn., Tangmere; 3.10.29. J. Cherrill, to No. 111 Sqdn., Hornchurch; 3.10.29. T. Gadd, to No. 41 Sqdn., Northolt; 3.10.29. R. P. Garnons-Williams, to No. 23 Sqdn., Kenley; 3.10.29. C. R. J. Hawkins, to No. 207 Sqdn., Eastchurch; 3.10.29. M. T. M. Hyland, to No. 35 Sqdn., Bircham Newton; 3.10.29. J. O. H. Lobley, to No. 33 Sqdn., Netheravon; 3.10.29. B. A. Oakley, to No. 35 Sqdn., Bircham Newton; 3.10.29. J. D. H. Slade, to No. 35 Sqdn., Bircham Newton; 3.10.29. J. R. Stebbing, to No. 56 Sqdn., North Weald; 3.10.29. A. T. Wilson, to No. 32 Sqdn., Kenley; 3.10.29. A. N. I. Worger-Slade, to No. 207 Sqdn., Eastchurch; 3.10.29. C. Sarsfield-Sampson, to No. 70 Sqdn., Iraq; 13.9.29. A. G. Adnams, to No. 10 Sqdn., Duxford; 3.9.29. A. F. P. Anning, to No. 26 Sqdn., Catterick; 3.9.29. B. A. Blythe, to No. 3 Sqdn., Upavon; 3.9.29. A. L. Brain, to No. 26 Sqdn., Catterick; 3.9.29. C. M. D. Chamber, to No. 111 Sqdn., Hornchurch; 3.9.29. C. M. Champion de Crespigny, to No. 4 Sqdn., S. Farnborough; 3.9.29. G. H. Clarks, to No. 25 Sqdn., Hawkinge; 3.9.29. H. R. Collins, to No. 13 Sqdn., Andover; 3.9.29. E. W. Downing, to No. 32 Sqdn., Kenley; 3.9.29. H. A. Fenton, to No. 4 Sqdn., S. Farnborough; 3.9.29. H. R. Hughes-Hallett, to R.A.F. Base, Calshot; 3.9.29. A. E. Louks, to No. 29 Sqdn., North Weald; 3.9.29. D. S. McDougall, to No. 23 Sqdn., Kenley; 3.9.29. F. A. McNeill, to No. 13 Sqdn., Andover; 3.9.29. G. O. St. J. Morris, to No. 111 Sqdn., Hornchurch; 3.9.29. K. W. Pell, to No. 2 Sqdn., Manston; 3.9.29. A. F. Powell, to No. 13 Sqdn., Andover; 3.9.29. R. A. R. Robinson, to No. 41 Sqdn., Northolt; 3.9.29. L. P. Rowley, to No. 32 Sqdn., Kenley; 3.9.29 J. S. Shakespeare, to No. 26 Sqdn., Catterick; 3.9.29. H. B. Collins and G. C. Holland, both to No. 5 Flying Training Sch., Sealand, on appointment to Permanent Commns.; 28.9.29.

The undermentioned Pilot Officers are posted to No. 5 Flying Training Sch., Sealand, with effect from 28.9.29:—A. G. Adnams, S. H. Bell, D. P. A. Boitel-Gill, J. C. L. Bruce, R. R. Chapman, L. E. Chiswell, G. B. S. Coleman, C. R. Davies, J. L. M. Davys, S. W. H. Egan, G. Egerton-Hine, T. N. Fraser, J. S. Hamilton, C. J. Hansford, J. N. Hepworth, L. M. Hooper, R. G. Hosken, N. C. Hyde, B. N. Matson, L. R. Mouatt, E. E. Noddings, R. C. Parker, I. N. Roome, K. N. Sayers, G. D. Seabourn, M. W. Simons, S. D. Slocum, J. A. MacD. Teacher, H. J. Ward, C. A. Washer, and H. J. Wilson.

Stores Branch

Flight Lieutenants: H. Parker, to R.A.F. Depot, Uxbridge; 27.9.29. A. H. Allan, to H.Q., Wessex Bombing Area, Andover; 21.9.29. V. B. Ranford, to Station H.Q., Heliopolis, Middle East; 28.9.29.

Flying Officer M. H. Jenks, to No. 101 Sqdn., Bircham Newton; 26.9.29.

Accountant Branch

Squadron Leader C. C. J. Croydon, to Station Hqrs., Andover; 1.10.29.

Flying Officer H. C. Bakes, to No. 1 School of Tech. Training (Apprentices), Halton; 1.10.29.

Medical Branch

Flight Lieutenants: C. W. Coffey, to No. 4 Sqdn., S. Farnborough; 21.9.29. E. J. T. McWeeney, M.B., to Palestine General Hospital; 30.8.29. E. P. Carroll, to Palestine General Hospital; 30.8.29. F. P. Schofield, M.C., to R.A.F. Officers' Hospital, Uxbridge; 1.10.29.

Flying Officer G. W. Paton, M.B., to Palestine General Hospital; 30.8.29.

The undermentioned Flying Officers are posted to the Medical Training Depot, Halton, on appointment to Short-Service Commns., with effect from 1.10.29:—

J. J. Corcoran, M.B., C. C. Fenton, M.B., B.S., B.Sc., C. G. Harold, M.B., A. Sheehan, M.B., D. D. Watson, M.B., and E. A. Wilson, M.D.

Chaplains' Branch

The Revd. S. H. Keen, to H.Q., R.A.F., Halton, on appointment to a Short-Service Commn.; 12.9.29. Revd. F. G. B. Sutherland, R.A.F. Depot, Middle East; 10.9.29. Revd. C. P. N. Rowband, to R.A.F. Base, Gosport, on appointment to a Short-Service Commn., 6.9.29.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—

Lieutenant (Flying Officer, R.A.F.): C. John, to Greenwich (Oct. 22).

Promotion

Mate: R. W. Wicks (Flying Officer, R.A.F.), to rank of Lieut. (seny. Oct. 1).

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THE ROYAL AIR FORCE MEMORIAL FUND

THE Executive Committee of the Fund held its fourth Meeting of the year on October 9. Sir Charles McLeod, Bart, Chairman and Honorary Treasurer, took the Chair.

Air Marshal Sir Edward L. Ellington, K.C.B., Air Officer Commanding-in-Chief, Air Defence of Great Britain, was elected a Member of the Committee, in the room of Air Vice-Marshal F. R. Scarlett, who is shortly proceeding to take over command of the R.A.F. in the Middle East Headquarters at Cairo.

The Secretary informed the Committee that the Vanbrugh Castle School, maintained by the Fund, opened for the winter term on September 10 last, with a full complement of 36 boys.

The report of the Grants Sub-Committee who deal with all applications for assistance from past and present Members of the Force, shows that during the fifteen weeks since the last meeting, on June 26, the Sub-Committee has dealt with 104 cases, and during the same period the Secretary had dealt with 178 cases of a less serious description, in practically all of which cases grants were made by either the Sub-Committee or Secretary.

Referring to a recent handsome donation to the Fund of £15,000 from an anonymous donor, the Committee were informed of the particulars concerning five cases of officers and ex-officers of the Royal Air Force whose children were helped by grants towards education.

The attention of the Committee was drawn to the fact that in accordance with a resolution passed at the beginning of the year, the commemoration of the signing of Peace on November 11, 1918, in respect to the R.A.F. War Memorial on the Victoria Embankment, London, will take place on the morning of SUNDAY, NOVEMBER 10, being the Sunday before the actual Armistice Day, namely November 11, but details of the ceremony cannot yet be published but will follow shortly.

The Committee authorized the provision of a wreath as usual, to be laid at the foot of the Memorial, by, it is hoped, Marshal of the Royal Air Force Sir H. M. Trenchard, Bart., G.C.B., Chief of the Air Staff, and they further sanctioned a grant of money for the provision of a wreath to be laid at the Scottish National War Memorial (R.A.F. Bay), on Edinburgh Rock, in celebration of the Armistice.

Dame Helen Gwynne-Vaughan, G.B.E., was unanimously appointed Deputy Chairman of the Executive Committee. The next meeting of the Committee will take place on December 11, 1929, at the offices of the Fund, at 3 p.m.

NOTICES TO AIRMEN

A.—Procedure for Aircraft reporting their Passage Across the Irish Sea.

B.—Temporary Conditions Affecting Flying

IT is hereby notified :—

A.—Passage of Aircraft Across the Irish Sea

The attention of pilots utilising the arrangements for reporting the passage of their aircraft across the Irish Sea, is called to the necessity for strict adherence to the full procedure as originally detailed in Notice to Airmen, No. 82 of 1928, and now given in *The Air Pilot*, Volume I, Part 2, § 5.

B.—Temporary Conditions Affecting Flying

1. *Castle Bromwich Aerodrome.*—Ploughing and levelling operations in progress to S.E. of the landing circle. Area of work marked with red flags. (*Signal* 26/9/1929).

2. *Farnborough Aerodrome.*—A neon air light is being operated experimentally every night from sunset to sunrise, exhibiting the Morse letter F, every 6 seconds, as follows :—

Light ½ sec. ; eclipse ½ sec.
Light ½ sec. ; eclipse ½ sec.
Light 1 sec., ; eclipse ½ sec
Light ½ sec. ; eclipse 3 secs. (*Signal* 30/9/1929).

3. *Leuchars Aerodrome.*—Levelling operations in progress. Areas of work marked with red flags. (*Signal* 25/9/1929.)

(*No.* 61 *of* 1929)

Flight in the Vicinity of Cardington Mooring Tower

IT is hereby notified :—

1. During the transfer of Airship R.101 (G-FAAW) from the shed to the mooring tower and while she is at or near the mooring tower, it is desired that no other aircraft should fly in the immediate vicinity.

2. Therefore, for the present, and until the cancellation of this Notice pilots of aircraft are requested not to fly within a radius of 3 miles of the mooring mast at Cardington.

(*No.* 62 *of* 1929.)

France : Low Flying Over Towns, Populated Areas, Meetings, Etc.

IT is hereby notified :—

1. Representations have been made by the French Air Ministry that British civil pilots, when flying in France, frequently fail to observe the French regulations affecting flights over towns and populated areas and over meetings or other places where people are likely to be assembled.

2. The attention of all pilots is therefore directed to the " Décret réglementant La Circulation Aérienne," dated May 19, 1928, issued by the French authorities, and particularly to Article 11 thereof, of which a translated extract is appended :—

" *Article* 11.

" Aircraft flying above inhabited areas shall conform to the following regulations :—

" No inhabited area (whatever its size), or place at which people gather, such as a beach, racecourse, sports ground, etc., shall be flown over at an altitude of less than 500 metres.

" No towns with a population of 10,000 to 100,000 shall be flown over at an altitude of less than 500 metres in the case of multi-engined aircraft, and 1,000 metres in the case of mono-engined aircraft.

" No towns with a population of over 100,000 shall be flown over at an altitude of less than 1,000 metres in the case of multi-engined aircraft and 2,000 metres in the case of mono-engined aircraft."

Cancellation.—Notice to Airmen No. 121 of 1920 is hereby cancelled.

(*No.* 63 *of* 1929.)

NOTICES TO GROUND ENGINEERS

Airscrews for Civil Aircraft

IT is hereby notified :—

The attention of Ground Engineers and all concerned is directed to the fact that airscrews, particulars of which are given hereunder, have been found to be unsuitable and that the use of these airscrews must be discontinued on and after January 1, 1930.

Airscrew Drawing Number.	Aircraft.	Engine.
Y. 573	Avro 504. N	Lynx.
5553/1	Argosy	Jaguar IV.
E. 766	Plover	Jupiter VI.
A.B. 7031 }	D.H. 9.	Puma.
A.B. 7031. E. }		
Y. 573/1	Autogyro	Lynx IV.
9078/2	Vulcan	Lion.
Y. 573/5	Avro 504. N.	Lynx.
Y. 573/3	Avro 504. N.	Lynx IV.
Watts 244 }	W. 8. F.	Eagle IX.
D.H. 1329 }		Puma.

(*No.* 20 *of* 1929.)

Approval of Materials for Repair or Overhaul of Licensed Aircraft

1. THE attention of ground engineers and all concerned is drawn to the fact that cases have occurred where details or components for which no certificate of inspection could be produced had been embodied in an aircraft for which a certificate of airworthiness was current or had been applied for. These parts had been obtained from surplus stocks thrown up by the Royal Air Force, or from various sources other than the manufacturer.

2. In this connection the attention of ground engineers is again directed to Notice to Ground Engineers No. 7 of the year 1922.

3. It is pointed out that the existence of an inspection stamp is not, in itself, sufficient evidence as to the serviceability of materials, details or components.

4. In every case, a Release Note, issued by the Aeronautical Inspection Directorate, or a manufacturer's certificate of inspection issued under Air Ministry authority, should be obtained, at the time of purchase, in respect of any material or part which is to be embodied in a certified aircraft, and should be held available for examination when the aircraft is next re-inspected.

(*No.* 21 *of* 1929.)

R.AE.S. AND INST.AE.E.

Official Notice

Informal Dinner and Discussion.—An informal dinner (for men only) and discussion will be held at the St. Ermin's Hotel, Caxton Street, Westminster, at 7.30 p.m., on Friday, November 15, 1929. After the dinner, Major J. S. Buchanan, O.B.E., A.M.I.Mech.E., F.R.Ae.S., will move :—

" That this meeting is of the opinion the present rules for the Schneider Trophy Race and the High-Speed Record are not consistent with the proper development of high-speed aircraft."

The chair will be taken by Colonel the Master of Sempill, A.F.C., A.F.R.Ae.S., President of the Society.

The price of ticketsi s 6*s.* 6*d.* each, and members may bring guests. Early application is necessary. Informal morning dress will be worn. Tickets may be obtained on application to

J. LAURENCE PRITCHARD, *Secretary.*

PUBLICATIONS RECEIVED

Hydro- und Aeromechanik nach Vorlesungen von L. Prandtl. By Dr. Phil. O. Tietjens. Julius Springer, Linkstrasse 23–24, Berlin W.9. Price Rm. 15.

Professional Papers of the Air Survey Committee : No. 5. *Calibration of Surveying Cameras.* By Capt. M. Hotine, R.E. H.M. Stationery Office, Kingsway, London, W.C.2. Price 2*s.* 6*d.* net.

The Armstrong Whitworth Atlas Army Co-Operation Aeroplane : With an Appendix on the Atlas Dual Control Aeroplane. Air Publication 1375. H.M. Stationery Office, Kingsway, London, W.C.2. Price 3*s.* net.

The Air Pilot (2*nd Edition*, 1929). *Volume* 1. *Great Britain and Ireland.* H.M. Stationery Office, Kingsway, London, W.C.2. Price 12*s*, 6*d.* net.

Aeronautical Research Committee Reports and Memoranda : No. 1224 (*Ae.* 379).—*On the Flow of Air Adjacent to the Surface of an Aerofoil.* By N. A. V. Piercy, D.Sc., and E. G. Richardson, B.A. December, 1928. H.M. Stationery Office, Kingsway, London, W.C.2. Price 1*s.* 3*d.* net.

The World, The Air and the Future. By Commander Sir Dennis Burney. Alfred A. Knopf, Ltd., 37, Bedford Square, London, W.C.1. Price 21*s.*

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AERONAUTICAL PATENT SPECIFICATIONS

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32,233. SCHNEIDER ET CIE. and J. FIEUX. Device for bringing a movable body to rest gradually, such as aeroplane coming to ground, etc. (304,716.)

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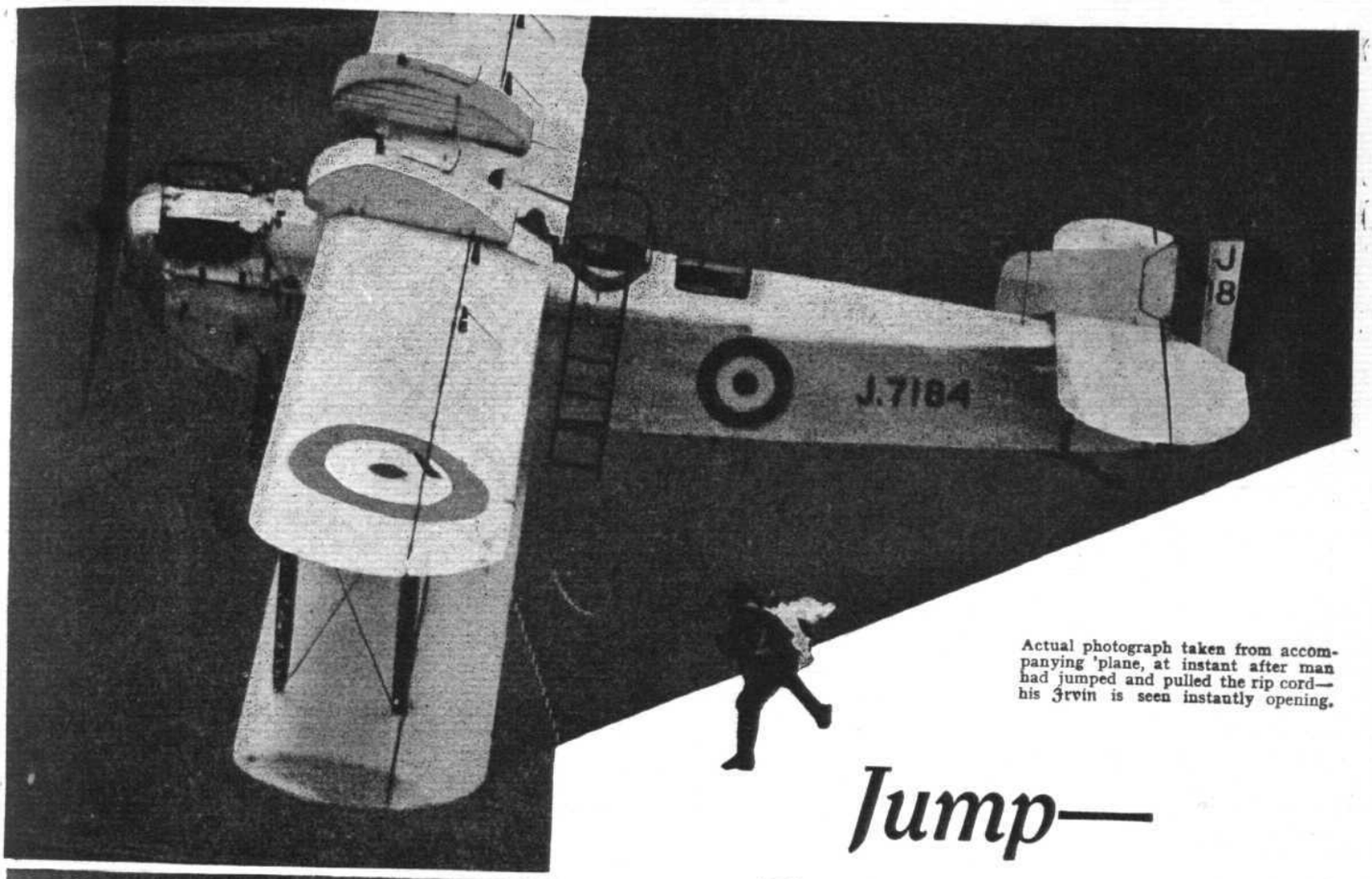
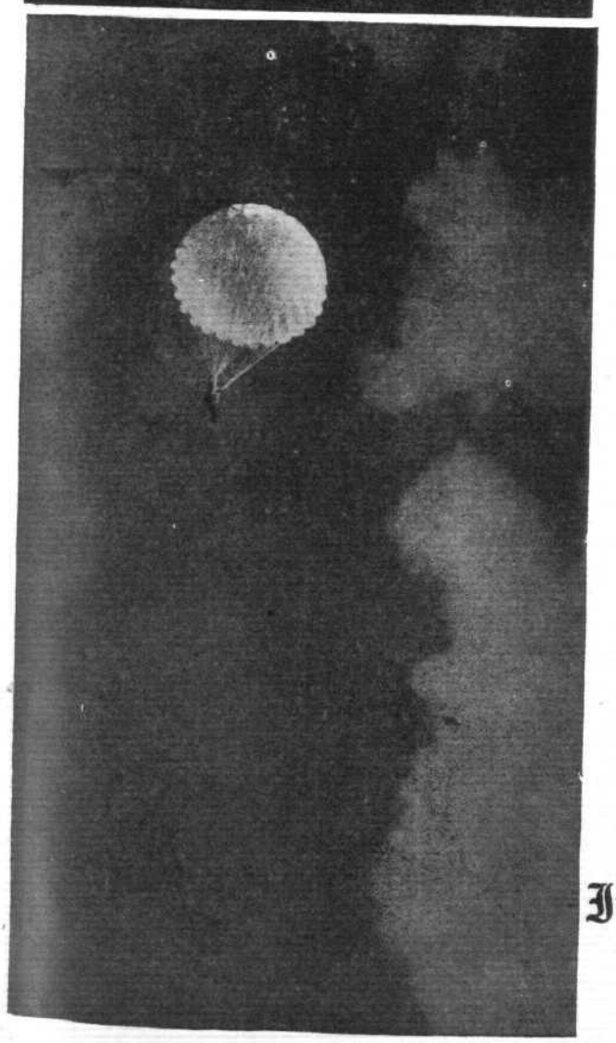


Actual photograph taken from accompanying 'plane, at instant after man had jumped and pulled the rip cord—his Irvin is seen instantly opening.

Jump—

---- Zip!



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